JERROLD®

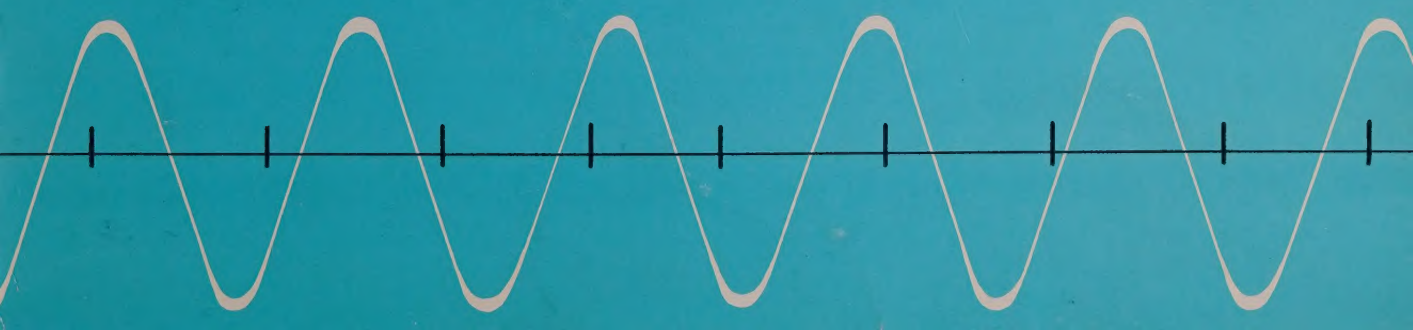
Instruction Manual

Model 900 B

Sweep Signal Generator

JERROLD MBC

PRECISION INSTRUMENTS FOR
MEASUREMENTS BY COMPARISON



SWEEP SIGNAL GENERATOR

MODEL 900-B

Figure 1—Sweep Signal Generator Model 900-B

JERROLD® ELECTRONICS CORPORATION
INDUSTRIAL PRODUCTS DIVISION
THE JERROLD BUILDING, PHILADELPHIA 32, PA.

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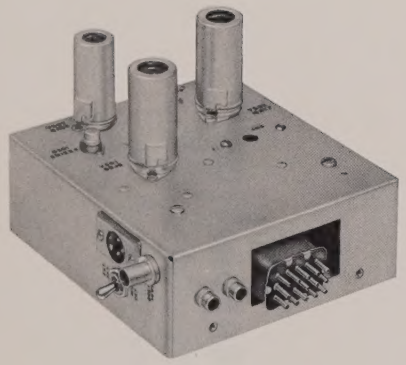
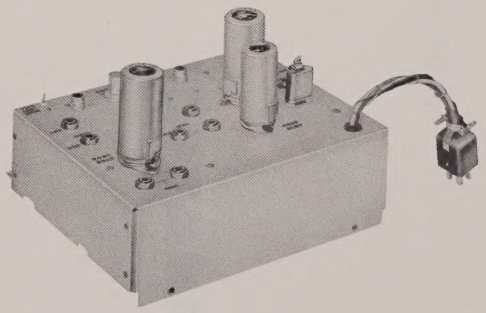
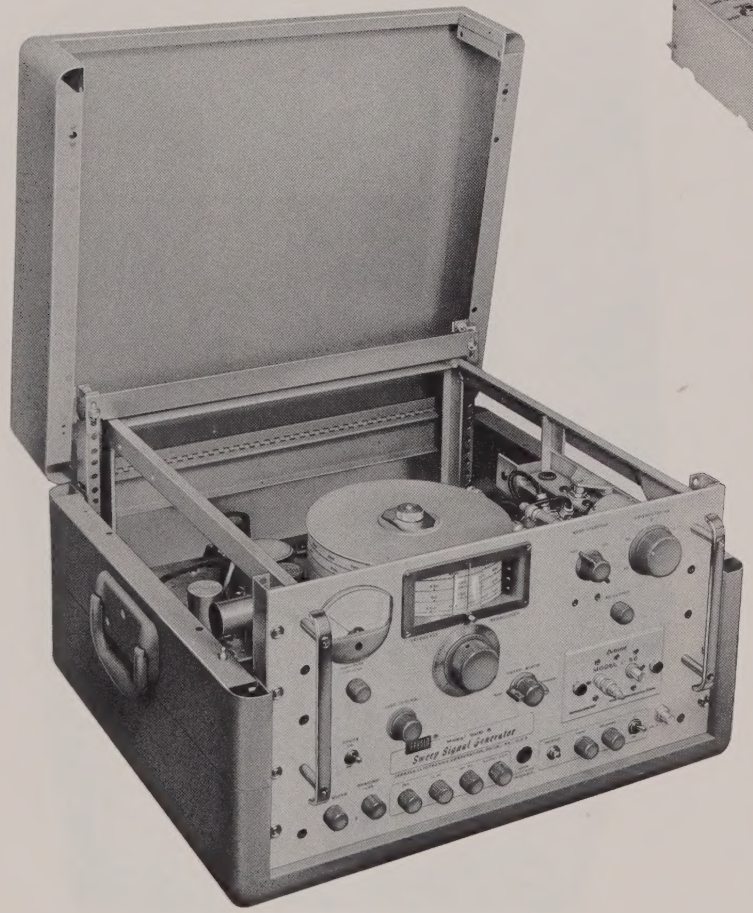
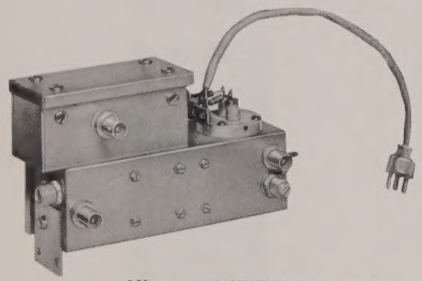


Preamplifier and
Birdy Amplifier

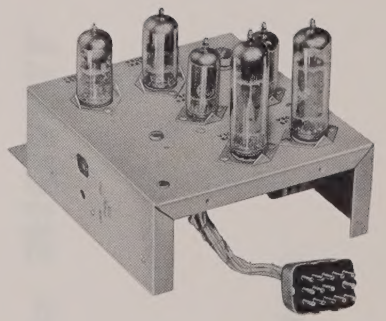


Harmonic Marker Generator





Mixer and VHF-ALC Detector



ALC Amplifier, Blanking Circuit
and Meter Amplifier

Figure 2—Sweep Signal Generator Model 900-B (Showing Modular Construction)

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Scope Description and Specifications

1-1 **SCOPE**

1-2 This publication contains operational and service instructions together with an electronic parts list for the Jerrold Sweep Signal Generator Model 900-B.

1-3 **DESCRIPTION**

1-4 The Jerrold Sweep Signal Generator Model 900-B is a precision test instrument designed to extend considerably the application of sweep frequency techniques to the quantitative analysis of electronic devices.

1-5 Model 900-B generates signals with center frequencies ranging from 500 kc to 1200 mc. The sweep widths may be as narrow as 10 kc or as wide as 400 mc. The rf output is exceptionally flat and is monitored by an accurate meter. A calibrated frequency dial shows the center frequency under each sweep condition.

1-6 Other features, among which are a built-in oscilloscope preamplifier, a crystal-controlled harmonic marker generator, a marker amplifier, and a precision attenuator cut test set-up time to a minimum and reduce bench-space requirements.

1-7 **SPECIFICATIONS**

1-8 Table 1 lists the specifications of the sweep frequency generator Model 900-B.

TABLE 1—SPECIFICATIONS

FREQUENCY RANGE—VARIABLE LIMITS	VHF (both Wide and Narrow) 500 kc to 400 mc UHF Narrow: 350 mc to 1200 mc Wide: 275 mc to 1100 mc
SWEEP WIDTH	VHF Narrow: Minimum 10 kc or less, Maximum 1 mc or more Wide: Minimum 500 kc or less, Maximum 400 mc or more UHF Narrow: Minimum 10 kc or less, Maximum 1 mc or more Wide: Minimum 500 kc or less, Maximum 40% of C.F. or more
OUTPUT VOLTAGE	VHF 0.25 v rms or more into a 50-ohm load UHF 0.5 v rms or more into a 50-ohm load
OUTPUT VOLTAGE VARIATION	VHF ±0.5 db at maximum sweep width *UHF ±0.5 db to 800 mc and ±1.5 db from 800 to 1200 mc at maximum sweep width. Output voltage variation less at narrower sweep widths. *As viewed on D-50 detector.
SPURIOUS BEATS AND HARMONICS	20 db or more below fundamental output
SOURCE IMPEDANCE	50 ohms with a VSWR of less than 1.5:1
DETECTOR	Full-wave, peak-to-peak feed-thru type. VSWR less than 1.3:1 to 900 mc and less than 1.4:1 to 1200 mc, with termination connected.
LINEARITY OF SWEEP	Within 5% of sweep width (in relation to the horizontal deflection voltage) for all VHF and UHF wide-band ranges (and all VHF and UHF narrow-band ranges between 10 kc and 1 mc).
FREQUENCY MODULATION HORIZONTAL	Line frequency, sinusoidal
DEFLECTION VOLTAGE	20 volts peak-to-peak
MARKERS (INTERNAL)	Built-in crystal-controlled harmonic markers at 1, 10, and 100 mc intervals. Each marker output is individually controlled from the front panel.
MARKER INPUT (EXTERNAL)	Requires 20 millivolts or more. Gain of marker amplifier variable from 0 to 100X.
OSCILLOSCOPE PREAMPLIFIER	Built-in preamplifier with gain variable from 2X to 200X . . . dc or ac coupling may be selected.
ATTENUATOR	Built-in variable attenuator 0 to 50 db in 10 db steps.
FREQUENCY DIAL	Calibrated in four ranges with an accuracy of ±1 division: VHF Narrow VHF Wide UHF Narrow UHF Wide
OUTPUT METER	Provides output level measurement, accurate within ±1 db from 0-400 mc. For accuracy from 400-1200 mc see CALIBRATION CURVE, Figure 3.
BLANKING	Return trace blanking optional with panel switch. Blanks to 0 voltage.
POWER SOURCE	100 to 130 or 200 to 260 v ac @ 50 or 60 cps.
POWER CONSUMPTION	Approximately 100 watts.
MOUNTING	Bench or rack mounting (remove from cabinet for standard EIA mounting).
DIMENSIONS	(Overall) 14″ x 23″ x 20″ (Without Cabinet) 10½″ x 19″ x 19″
SHIPPING WEIGHT	100 lbs.

1-9 Table 2 lists the tube complement of the instrument.

TABLE 2—TUBE CHART

TUBE NO.	TYPE	LOCATION	FUNCTION
V-1	0A2	MAIN CHASSIS	B— Voltage regulating
V-2	0A2	MAIN CHASSIS	B+ Voltage regulating
V-201	5675	LOCAL OSC. CHASSIS	600 mc oscillator
V-301	6AU6	ALC CHASSIS	ALC amplifier
V-302	6AU6	ALC CHASSIS	push-pull input
V-303	6CW5	ALC CHASSIS	ALC amplifier
V-304	6CW5	ALC CHASSIS	push-pull output
V-305	6922	ALC CHASSIS	Meter amplifier
V-306	12AT7	ALC CHASSIS	Blanking tube
V-401A	½6922	HARMONIC MARKER CHASSIS	5 mc crystal-controlled osc.
V-401B	½6922	HARMONIC MARKER CHASSIS	1 mc multi-vibrator
V-402	6CB6	HARMONIC MARKER CHASSIS	10 mc multiplier
V-403A	½6922	HARMONIC MARKER CHASSIS	50 mc multiplier
V-403B	½6922	HARMONIC MARKER CHASSIS	100 mc multiplier
V-501	6922	PREAMPLIFIER CHASSIS	Preamplifier input
Q-1	2N1224	PREAMPLIFIER CHASSIS	Second stage amplifier
Q-2	2N1224	PREAMPLIFIER CHASSIS	(transistors)
V-502	6AU6	PREAMPLIFIER CHASSIS	Cathode follower output
V-503	12AY7	PREAMPLIFIER CHASSIS	Birdy amplifier
V-601	5675	HEAD CAVITY	Sweep oscillator

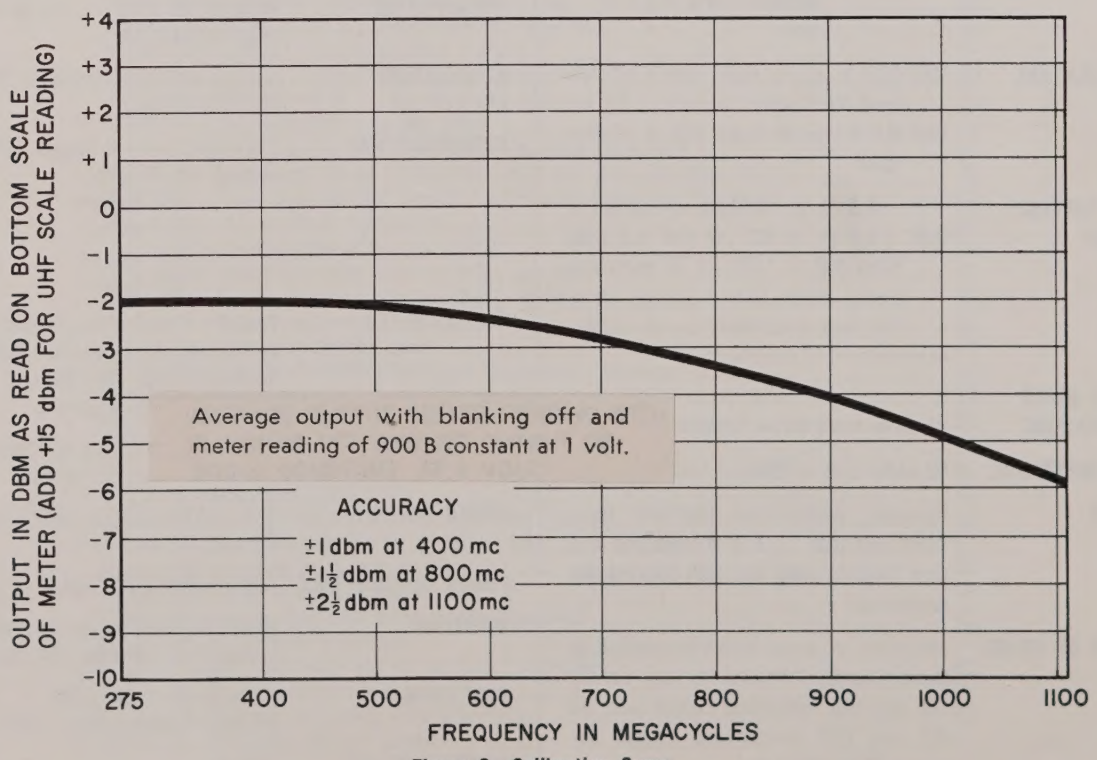


Figure 3—Calibration Curve

Preparation and Initial Check

2-1 PREPARING EQUIPMENT FOR USE

2-2 Remove outer container and packing material. Remove inner container and packing material. Remove plastic bag from 900-B and check contents of package.

CONTENTS OF PACKAGE

1 unit Model 900-B
1 termination Model TR-53 (in cloth bag affixed to line cord)
1 blue warranty card
1 Instruction Manual
1 Quality Control Certificate IP-A2-011 (attached to left front handle)
1 Caution Tag 432-226 (attached to removable detector D-50)
1 Adapter (to adapt line cord to two-wire socket)

2-3 **REMOVE SHIPPING BOLT** (see Fig. 49)
Open cover on 900-B. A triangular bracket is welded to the inside of the chassis at the upper right, above and between two rubber grommets. Remove the shipping bolt located at the apex of the bracket and screw the removed bolt into the empty hole in the bracket for safekeeping. Close cover and place unit in desired location on test bench.

2-4 RACK MOUNTING

2-5 Remove the eight screws (four on each side of the front panel) which hold unit in cabinet. Open cover and loosen two screws (one on each side of rear bracket) and raise bracket to permit removing unit from cabinet. Mount on standard 19″ rack and insure that the rear end of the 900-B is supported.

2-6 ACCESSORY EQUIPMENT REQUIRED

2-7 An oscilloscope is necessary to display the signals generated by the 900-B. A dc coupled scope is preferred but an ac coupled scope with good square-wave response at power line frequency may be used. Vertical sensitivity of 0.1 v per cm is adequate because of the added gain provided by the scope preamplifier built into the 900-B.

2-8 CONTROLS CHART

The operator should be thoroughly familiar with the various controls, fittings and adjustments on the 900-B. A CONTROLS CHART, Table III supplies this information.

TABLE III—CONTROLS CHART
CONTROLS, FITTINGS, AND ADJUSTMENTS (FRONT PANEL)

NAME	SCHEM. DES.	TYPE	FUNCTION
METER	M-301	rf output meter	Monitors rf output voltage.
		Top scale	Calibrated from 0.5 to 2 volts in ½ volt steps. Indicates output voltage on UHF ranges (see Fig. 3 for limits).
		Middle scale	Calibrated from 0 to 0.35 volts in 1/10 volt steps. Indicates output voltage on VHF ranges.
		Bottom scale	Calibrated from —10 to +4 dbm in 1 dbm step. Read directly on VHF ranges. Add 15 dbm on UHF ranges (see Fig. 3 for limits).
FREQUENCY MEGACYCLES		Calibrated dial	Denotes center frequency of range of frequencies being swept. Scale in use is indicated by illuminated arrows.
		Top scale UHF-NARROW	Calibrated from 350 to 1200 mc in 10 mc steps.
		Second scale UHF-WIDE	Calibrated from 275 to 1100 mc in 10 mc steps.
		Third scale VHF-WIDE	Calibrated from 0 to 460 mc in 10 mc steps.
		Bottom scale VHF-NARROW	Calibrated from 0 to 450 mc in 10 mc steps.
		Interpolating vernier (on center-frequency knob)	Located below frequency dial. Calibrated for interpolation between the 10 mc steps on frequency dial.
SWEEPWIDTH WIDE/NARROW	SW-3	2-position switch	
		WIDE	Permits sweeping of VHF or UHF over a 1 mc to 400 mc sweepwidth.
		NARROW	Permits sweeping of VHF or UHF over a 10 kc to 2 mc sweepwidth.
BAND SELECTOR VHF/UHF	SW-5	2-position switch	
		VHF	Selects VHF range of center frequencies.
		UHF	Selects UHF range of center frequencies.
ATTENUATOR DECIBLES	RF ATTENUATOR	6-position switch	
		0	No attenuation of rf output.
		10	Attenuates rf output 10 db.
		20	Attenuates rf output 20 db.
		30	Attenuates rf output 30 db.
		40	Attenuates rf output 40 db.
		50	Attenuates rf output 50 db.

TABLE III—CONTROLS CHART—(Continued)

NAME	SCHEM. DES.	TYPE	FUNCTION
PULL TURN FOR ZERO	SW-11	Switch and potentiometer	
	R-28	IN	Normal position (oscillator energized).
		OUT	Oscillator de-energized, rotate knob to zero meter.
FINE TUNING	R-14	Potentiometer	Fine frequency tuning adjustment.
POWER	SW-1	2-position switch	
ON		ON	Energized 900-B.
OFF		OFF	De-energized 900-B.
RF OUTPUT	R-10	Potentiometer	
		counter-clockwise	Minimum rf output.
		clockwise	Maximum rf output.
SWEEPWIDTH	R-9	Potentiometer continuously variable	Controls sweeping wobbulator to provide sweeping range from minimum to maximum of range selected by position of BAND SELECTOR VHF/UHF switch and SWEEPWIDTH WIDE/NARROW switch.
PHASING TURN	SW-10	Switch and potentiometer	
BLANKING PULL	R-8	IN	No blanking of reverse trace. Adjust potentiometer till traces coincide on scope.
		OUT	Blanks reverse trace on scope.
MARKER GAIN	SW-6	2-position switch and potentiometer	
1 MC			
PULL-TURN	R-21	IN	1 mc marker generator de-energized.
		OUT	1 mc marker generator energized to provide birdy marker at 1 mc intervals.
		Turn clockwise	Increases amplitude of 1 mc markers.
10 MC	SW-7 R-22	2-position switch and potentiometer	
		IN	10 mc marker generator de-energized.
		OUT	10 mc marker generator energized to provide birdy markers at 10 mc intervals.
		Turn clockwise	Increases amplitude of 10 mc markers.
100 MC	SW-8 R-23	2-position switch and potentiometer	
		IN	100 mc marker generator de-energized.
		OUT	100 mc marker generator energized to provide birdy markers at 100 mc intervals.
		Turn clockwise	Increases amplitude of 100 mc markers.
MASTER GAIN	SW-9 R-24	2-position switch and potentiometer	
		IN	Provides amplitude level for all marker generator circuits energized (1, 10, and 100 mc).
		Turn clockwise	Increases amplitude of all markers generated (1, 10, and 100 mc).
		OUT	Connects external markers to circuit.
		Turn clockwise	Increases amplitude of all markers generated (1, 10, and 100 mc and external markers).
FIXED OSCILLATOR FREQUENCY	C-205	Capacitor screw-driver adjustment	Fine adjustment on VHF local oscillator frequency normally set to 600 mc.
PREAMPLIFIER			
BAL	R-527	Potentiometer knurled shaft	Adjust so that reference trace on scope remains stationary when GAIN control in this group is varied.
GAIN	R-506	Potentiometer	Controls gain of scope preamplifier.
DC LEVEL	R-37	Potentiometer	Sets dc reference level on scope set for 0 dc at 0 rf level.
AC-DC	SW-12	2-position switch	
		AC	AC couples the preamplifier output to scope vertical input.
		DC	DC couples the preamplifier output to scope vertical input.
RF OUTPUT	J-4	BNC fitting	For connecting rf output of 900-B to circuit under test.

TABLE III—CONTROLS CHART—(Continued)

CONTROLS, FITTINGS, AND ADJUSTMENTS (REAR APRON OF CHASSIS)

NAME	SCHEM. DES.	TYPE	FUNCTION
SCOPE HORIZ	J-1	BNC fitting	Connection from 900-B to horizontal input of scope.
BLK PHASE	R-29	Potentiometer screw-driver adjustments	Adjust blanking phase so that blanking occurs in phase with the start and stop of the sweep. Adjustments made with blanking on.
PHASE REV	SW-4	2-position switch NORMAL PHASE REV	 Normal presentation on scope. Reverses phase of driving voltage to wobbulator to reverse presentation on scope.
EXTERNAL MARKERS	J-2, 3	BNC fittings (2)	Used to feed external markers to 900-B.
EXT WOBB		Terminal board	Screws 2 and 3 are normally linked together. If external drive voltage is to be used, disconnect link between 2 and 3 and connect drive between 1 (gnd) and 2.
2 AMP FUSE	FS-1	Fuse	Protects instrument against being plugged into 220 v line when in 110 v position.

CONTROLS, FITTINGS, AND ADJUSTMENTS (REAR OF PREAMP CHASSIS)

EXT DET INT DET	SW-501	2-position switch EXT DET INT DET	 The internal detector of the 900-B is disconnected and an external detector can be plugged into the adjacent 3-prong Cannon receptacle. Normal position with internal detector of 900-B in circuit.
SCOPE VERT	J-501	BNC fitting	Connection from 900-B to vertical input of oscilloscope.

CONTROLS, FITTINGS, AND ADJUSTMENTS (TOP OF MAIN CHASSIS)

VHF-AGC DET	S-302	4-prong cinch socket	Connection for VHF-AGC detector to ALC circuit of 900-B.
SWEEP OSC	P-15	6-prong Jones plug	Connection for power to sweep oscillator head.
HARMONIC MARKER	P-401	4-prong Jones plug	Connection for power to harmonic marker chassis.
WOBB DRIVE	R-6	Potentiometer	Adjusted to limit power supplied to wobbulator to prevent bottoming of the wobbulator at maximum sweepwidth setting of 900-B.
B+ .1 AMP	FS-2	Fuse slo-blo	Protection for B+ power supply circuits.
B— .1 AMP	FS-3	Fuse slo-blo	Protection for B— power supply circuits.

CONTROLS, FITTINGS, AND ADJUSTMENTS (BOTTOM OF CHASSIS)

230 V-115 V	SW-13	2-position switch 230 V 115 V	 Connects proper leads to transformer for 230-V source. Connects proper leads to transformer for 115-V source.
50	S-1	Jones socket	Transformer connection for 50-cycle operation.
60	S-2	Jones socket	Transformer connection for 60-cycle operation.
CATHODE TUNING PLATE TUNING	C-201 C-206	Trimmers screw-driver adjustments	Factory-adjusted to set frequency of VHF local oscillator.

CONTROLS, FITTINGS, AND ADJUSTMENTS (ALC CHASSIS)

METER CALIBRATE	R-304	Potentiometer	Adjusted to calibrate meter circuit of 900-B.
ALC GAIN	R-319	Potentiometer	Adjusted for proper gain of ALC amplifier.
ALC BIAS	R-314	Potentiometer	Adjusted to obtain linear operation of ALC amplifier.

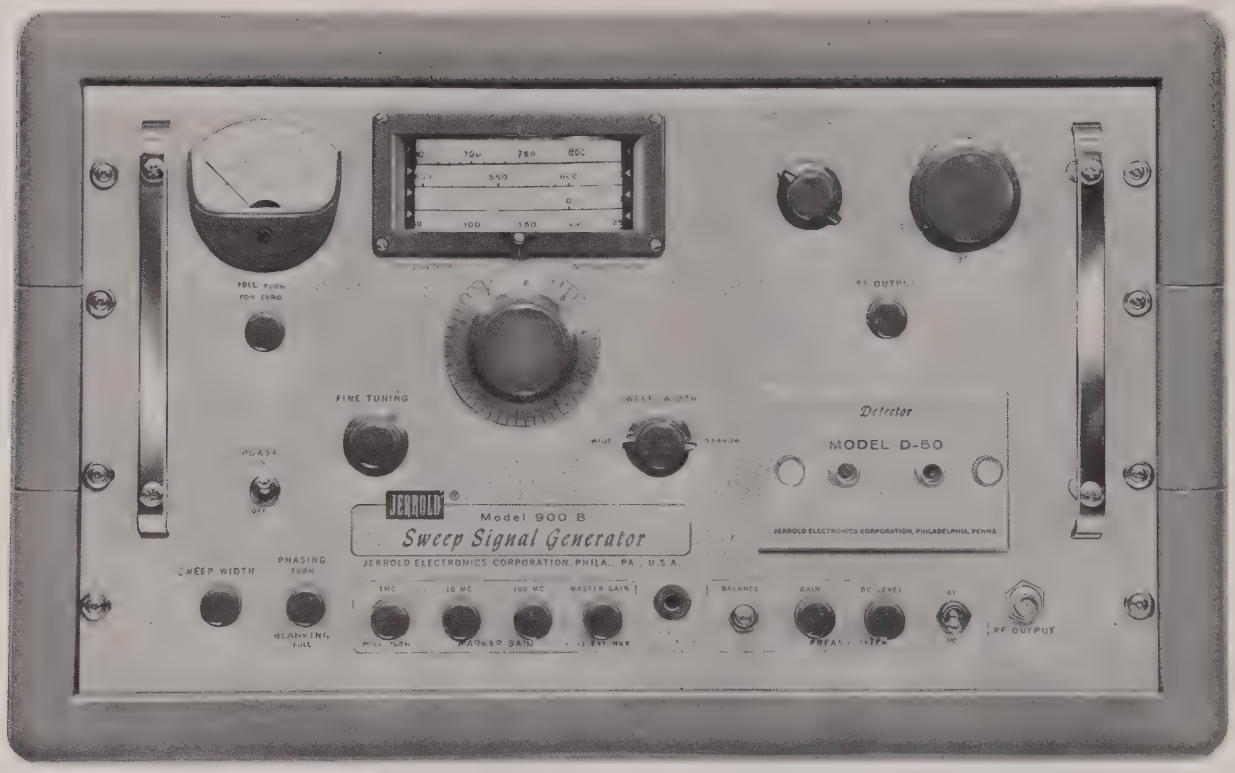


Figure 4—Front Panel

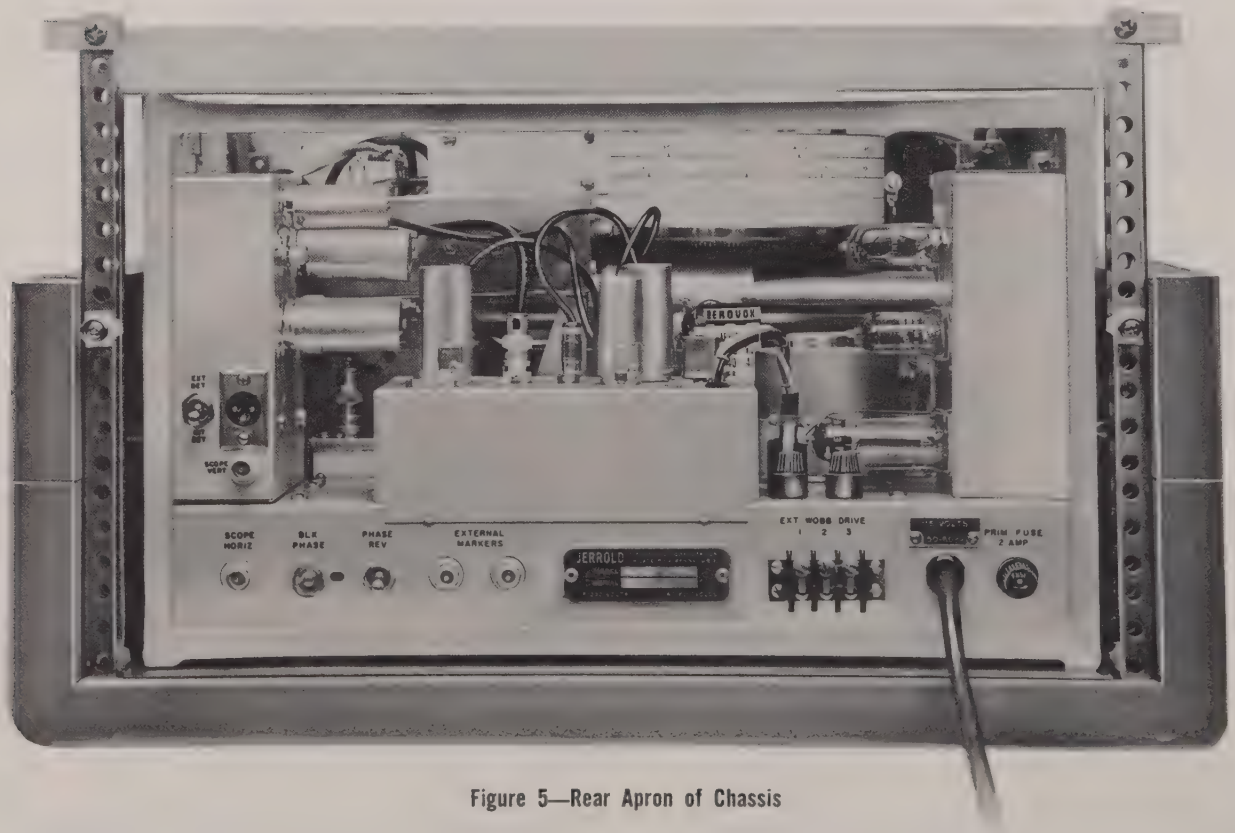


Figure 5—Rear Apron of Chassis

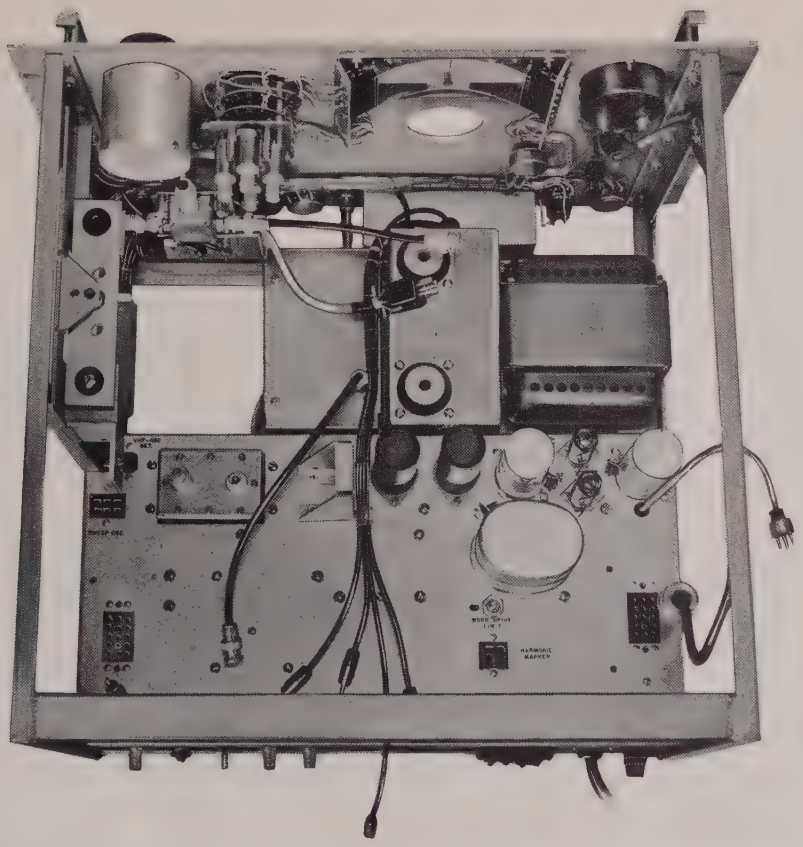


Figure 6—Top of Main Chassis (Unitized Components Removed)

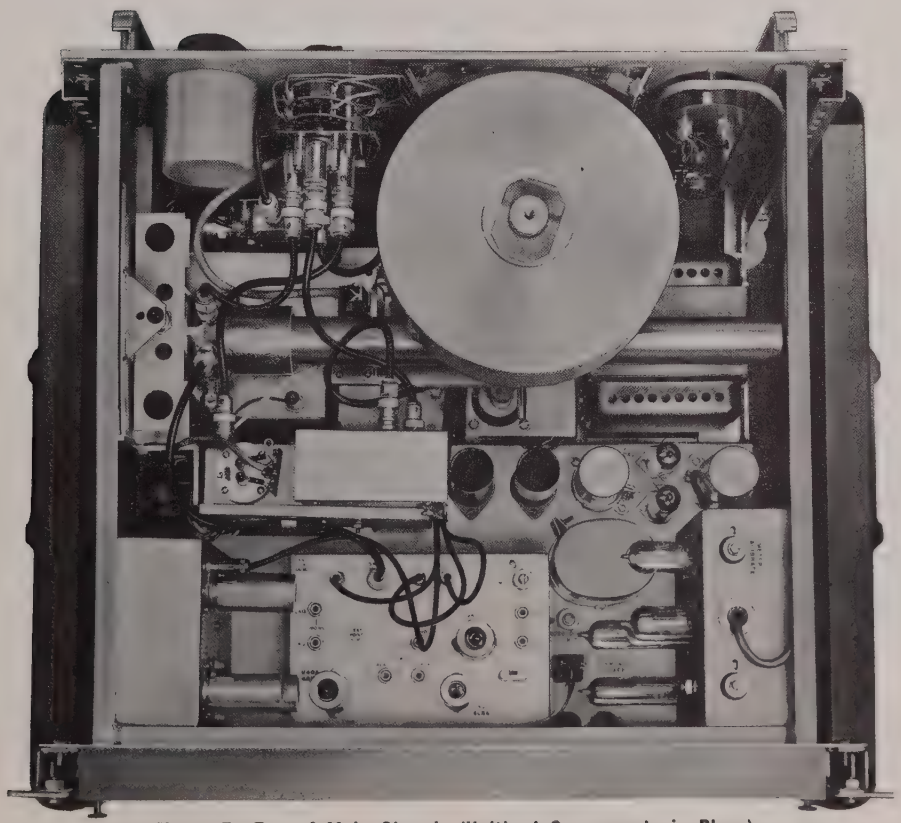


Figure 7—Top of Main Chassis (Unitized Components in Place)

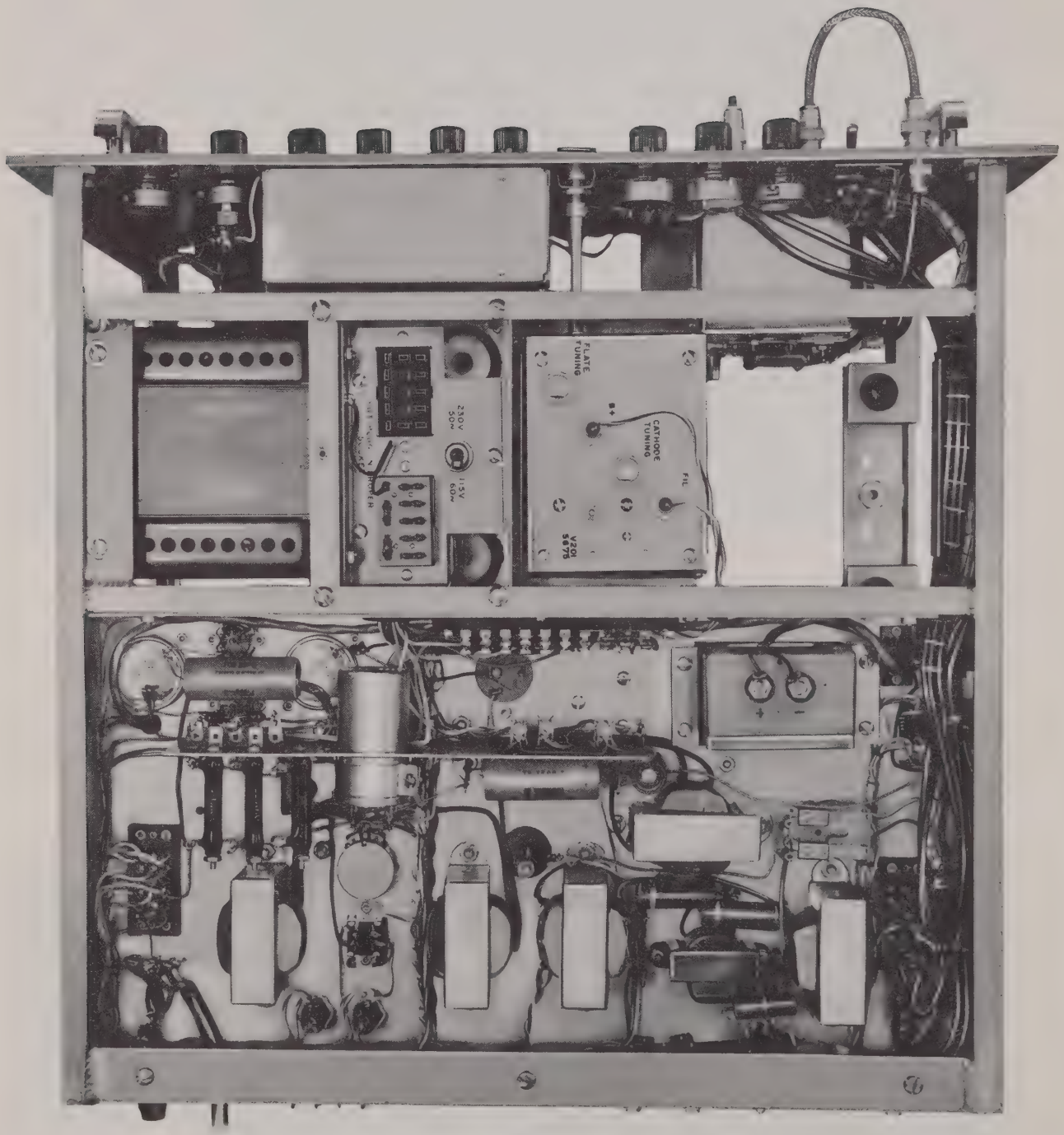


Figure 8—Bottom of Chassis

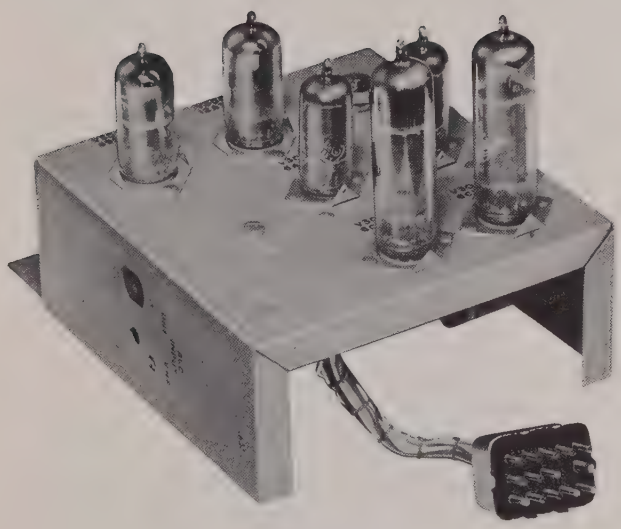


Figure 9—ALC Chassis

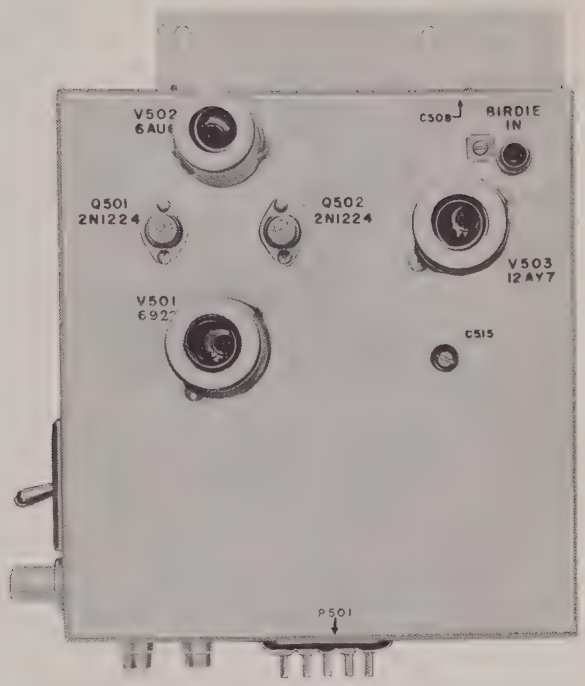


Figure 11—Preamp Section (Top View)

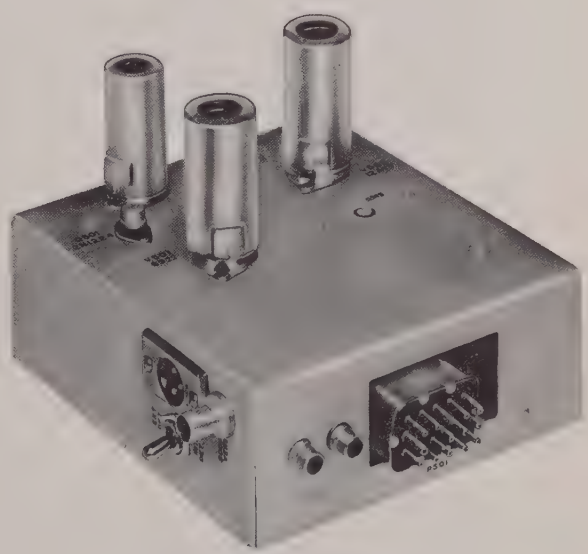


Figure 12—Preamp Chassis

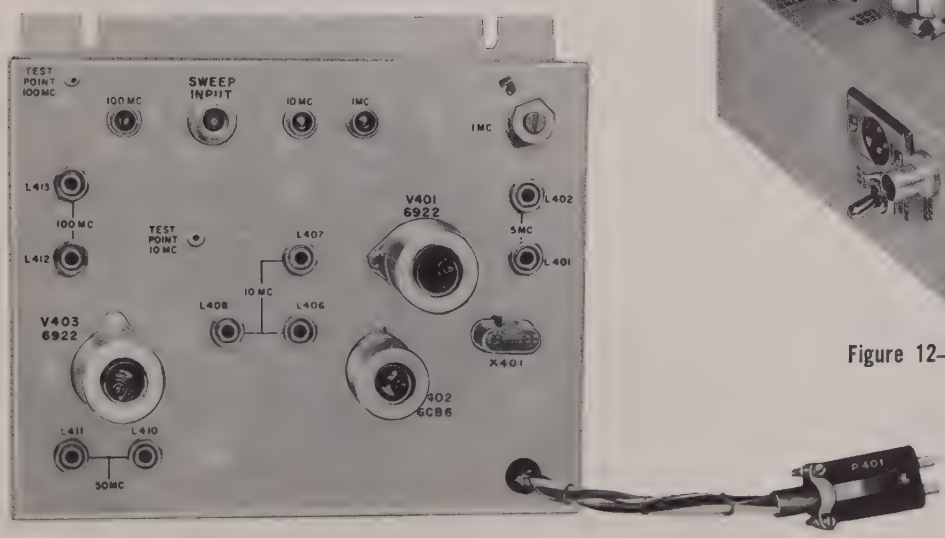


Figure 10—Harmonic Marker Chassis

2-9 INITIAL CHECK

2-10 Step-by-Step Procedure

1. Connect SCOPE HORIZ fitting on rear apron of 900-B chassis to the horizontal input of oscilloscope.
2. Connect SCOPE VERT fitting on rear of 900-B preamplifier chassis to the dc-coupled vertical input of oscilloscope.
3. Set PREAMPLIFIER AC-DC switch to DC position.
4. Set oscilloscope vertical sensitivity to 0.1 or 0.2 volts per cm.
5. Set PREAMPLIFIER GAIN control to maximum ccw position.
6. Connect RF OUTPUT of 900-B to one connector on the D-50 detector on the front panel using a short piece of high-quality 50 ohm coaxial cable (RG-55/U or equivalent). Terminate the other connector on the D-50 with the Jerrold Model TR-53 shipped with the instrument.
7. Set BAND SELECTOR switch to UHF position.
8. Set SWEEPWIDTH WIDE NARROW switch to WIDE position.
9. Set RF OUTPUT control full cw.
10. Set ATTENUATOR DECIBELS switch to 20 position.
11. Plug power cord of 900-B into a 117-volt, 60-cycle source.
12. Turn POWER switch to ON position and allow thirty minutes for warm-up.
13. Set SWEEPWIDTH control full cw.
    Note: If wobbulator chatters, turn SWEEPWIDTH control ccw until noise stops. This chattering does **not** indicate any malfunction of the instrument. No harm can result from chattering noise unless it is unnecessarily prolonged.
14. Pattern should appear on oscilloscope. If pattern does not appear, adjust PREAMPLIFIER BAL and/or DC LEVEL controls until pattern appears.
15. Balance preamplifier by simultaneously turning PREAMPLIFIER GAIN control cw and PREAMPLIFIER BAL control in the direction necessary to keep pattern in position on oscilloscope screen. When the PREAMPLIFIER GAIN control can be moved through its entire range without changing the position of the base line of the pattern on the screen, the preamplifier is balanced.
16. The PREAMPLIFIER DC LEVEL control may be adjusted to set the desired position of the base line on the oscilloscope screen.
17. Pull BLANKING PULL switch to OUT position.
18. Pull 100 MC switch OUT.
19. Set MASTER GAIN control to IN position and turn full cw.
20. Turn 100 MC control cw until markers appear. From two to four markers should be observed, depending on the setting of the center frequency dial.
21. Push BLANKING PULL switch to IN position to observe return trace and double set of markers.
22. Adjust PHASING TURN control until traces and markers coincide on oscilloscope screen.
23. Pull BLANKING PULL switch to OUT position.
24. Turn RF OUTPUT control slowly ccw to flatten response. When turned still further ccw, the rf output will decrease and the meter will indicate less rf output.
25. Try various SWEEPWIDTH control settings.
    Note: Whenever SWEEPWIDTH control setting is changed, it is necessary to readjust phase (steps 21, 22 and 23).
26. Use 1 MC and 10 MC markers to check narrower wide sweepwidths.
27. Place SWEEPWIDTH WIDE NARROW switch to NARROW position and SWEEPWIDTH control to maximum cw.
28. Use 1 MC markers to check maximum narrow sweepwidths. Divisions on the scope may be used to determine intermediate points between the 1 MC marks or external markers may be used to supply reference points. See Section III for the proper use of markers.
29. Try various SWEEPWIDTH control settings as in step 25. This completes the initial check of the UHF wide and narrow functions of Model 900-B.
30. Set BAND SELECTOR switch to VHF position.
31. Set SWEEPWIDTH WIDE NARROW switch to WIDE position.
32. Set ATTENUATOR DECIBELS switch to 0 position.
33. Set FREQUENCY MEGACYCLES to approximately 200 on scale indicated by illuminated arrow.
34. Observe pattern on oscilloscope to see position of 0 beat. If 0 beat is not located at extreme left of pattern, adjust FREQUENCY MEGACYCLES until the 0 beat is properly positioned.
35. Repeat steps 17 through 28.
36. Try various SWEEPWIDTH control settings as in step 25. This completes the initial check of the VHF wide and narrow functions of Model 900-B.

Markers

3-1 INTERNAL MARKERS

3-2 The internal marker circuits in the 900-B provide frequency markers at 100 mc, 10 mc, and 1 mc, and at all their multiples within the frequency range of the sweep. These markers are derived from a 5 mc crystal-controlled oscillator and are extremely accurate. Separate amplitude controls are provided for the three ranges of harmonics to allow quick identification of the frequency represented by any one marker.

3-3 The Use of Internal Markers

3-4 Step-by-Step Procedure

1. With all markers OFF (controls pushed in) the response of a resonant circuit is observed (Fig. 13). The 900-B is in the WIDE sweep condition, the frequency scale reads about 750 mc.

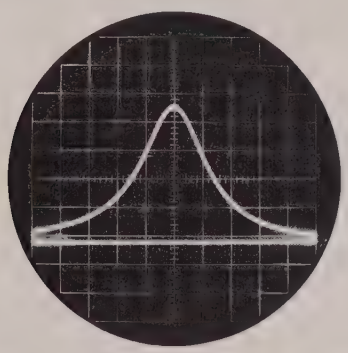


Figure 13—Response of a Resonant Circuit

2. The sweepwidth is increased, the 100 MC marker control is pulled ON and set for visible markers (Fig. 14). The curve maximum is between two marks which are identified (from the setting of the frequency dial) as 700 and 800 mc.

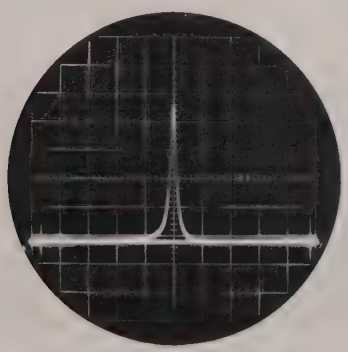


Figure 14—100 MC Marks on Response

3. The 10 MC control is pulled ON and set for somewhat smaller marks. The maximum is found to be between the 4th and 5th marks counting up from 700 mc, i.e., between 740 and 750 mc (Fig. 15).

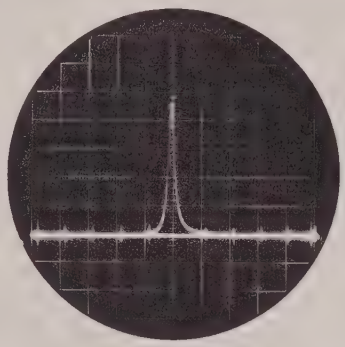


Figure 15—10 MC Marks on Response

4. The sweepwidth is decreased to put the 740 and 750 marks near screen edge and the 1 MC marker control turned ON. The maximum is seen to fall between the 7th and 8th mark, or between 747 and 748 mc (Fig. 16).

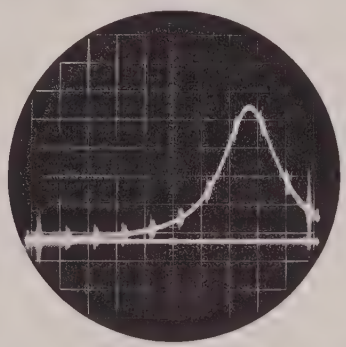


Figure 16—1 MC Marks on Response

5. If further division is required the sweepwidth can be adjusted to put two known 1 mc marks at screen edges, the 0.1 mc points being estimated from the divisions on the scope screen (Fig. 17).

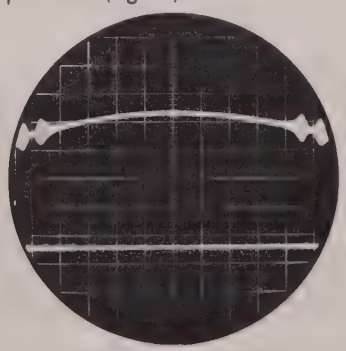


Figure 17—Estimating 0.1 MC Points on Response

Note: When using the VHF section of the sweep, marker frequency accuracy is obtained only after carefully setting the VHF fixed oscillator to 600 mc. This is important because the marker signals are derived from the UHF sweep directly, and are correct for VHF only when the VHF fixed oscillator is set precisely on 600 mc.

3-5 EXTERNAL AND SIDEBAND MARKERS

3-6 When frequency marks related to an external source are wanted, the output of this source is connected to the EXTERNAL MARKER input and the MASTER GAIN marker control is pulled out to connect the external circuits. Both the output level of the external marker source and the setting of the MASTER GAIN control affect the height of the marker birdies. An understanding of the relative effect of these two settings will help to make possible the most effective use of these circuits.

3-7 Obtaining Clearest Marking at Frequency of External Marker

3-8 Use **low** output from the marker oscillator, and a **high** setting of the MASTER GAIN control. Keep the marker birdy as small as clear visibility will allow to avoid confusing the presentation. Low output from the external oscillator provides strongest birdy at the fundamental frequency of that oscillator and minimizes birdies at its harmonic frequencies.

3-9 Obtaining Birdy Marks at Harmonics of External Marker

3-10 Use **high** output from the marker oscillator, with a low setting of the MASTER GAIN control. The high level applied to the marker mixer results in distortion and generation of harmonic birdies.

3-11 These effects are illustrated in Figs. 18 and 19. Fig. 18 shows the birdy mark produced with a 0 to 200 mc sweep, an external marker at 50 mc set for 2 millivolts output, with a high MASTER GAIN control setting. A single mark is seen. Turning the output of the marker up to 200 millivolts and turning the MASTER GAIN control down results in the pattern of Fig. 19, showing marks at harmonics of the marker frequency.

3-12 Built-in Birdies

3-13 When the 900-B is used in the VHF condition with EXT. MARKER in ON position, birdies will be observed on the trace even though no external marker is connected. These are especially evident at 100 mc, 200 mc and 300 mc with weaker ones at other frequencies.

3-14 The extremely wide VHF sweepwidths available in the 900-B (e.g., 0.5 to 400 mc) can only be obtained by using a beat-frequency principle. Spurious products at frequencies other than the desired difference frequency are unavoidable in such oscillators, and although every effort has been made to design the mixer for minimum spurious output there is enough to generate these "built-in birdies."

3-15 An example will show how these are produced. For a VHF output at 300 mc the UHF oscillator is set to 900 mc and the major output occurs at 300 mc, the difference frequency between 900 mc and the 600 mc output of the fixed oscillator. A much weaker component (at least 20 db down) is produced by the beat between the second harmonic of the VHF fixed oscillator (twice 600 or 1200 mc) and the sweep at 900 mc. As the sweep oscillator goes past 900 mc these two components zero beat with each other and generate a small but noticeable birdy.

3-16 These effects are most noticeable at high settings of the RF OUTPUT control. **For minimum spurious output and clearest marker presentation use the lowest RF OUTPUT setting which allows satisfactory presentation.**

3-17 Side-Band Markers

3-18 In cases where a bandpass response is to be observed, it is often convenient to provide frequency markers at the center, the upper, and the low frequency limits of the desired band. This can be accomplished with the Model 900-B by using two marker oscillators, one having a frequency at the center of the band to be observed, the output of this marker being connected to one of the two external marker inputs, and a second marker generator having a frequency equal to one-half of the bandwidth of the band to be observed, connected to the other external marker input. By proper setting of the two oscillator output controls and the MASTER GAIN control on the sweep, it is possible to get marker pips at the center frequency and the upper and lower limits. Fig. 20 shows the detected output of the sweep. Its center frequency is set at 60 mc with about 4 mc sweep width and a single marker at 60 mc. Fig. 21 illustrates the effect of connecting a second marker oscillator tuned to 1.5 mc, which adds sideband markers 1.5 mc above and below 60 mc.

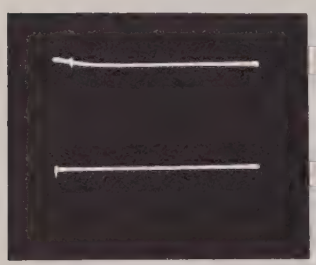


Figure 18—Single Birdy Mark at 50 MC

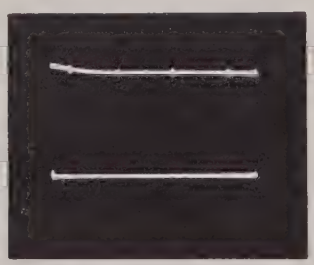


Figure 19—Harmonics of 50 MC Mark Due to Change in Control Settings

Figure 20—Single Marks at Center Frequency

Figure 21—Sideband Marks at Extremities of Sweep

Applications

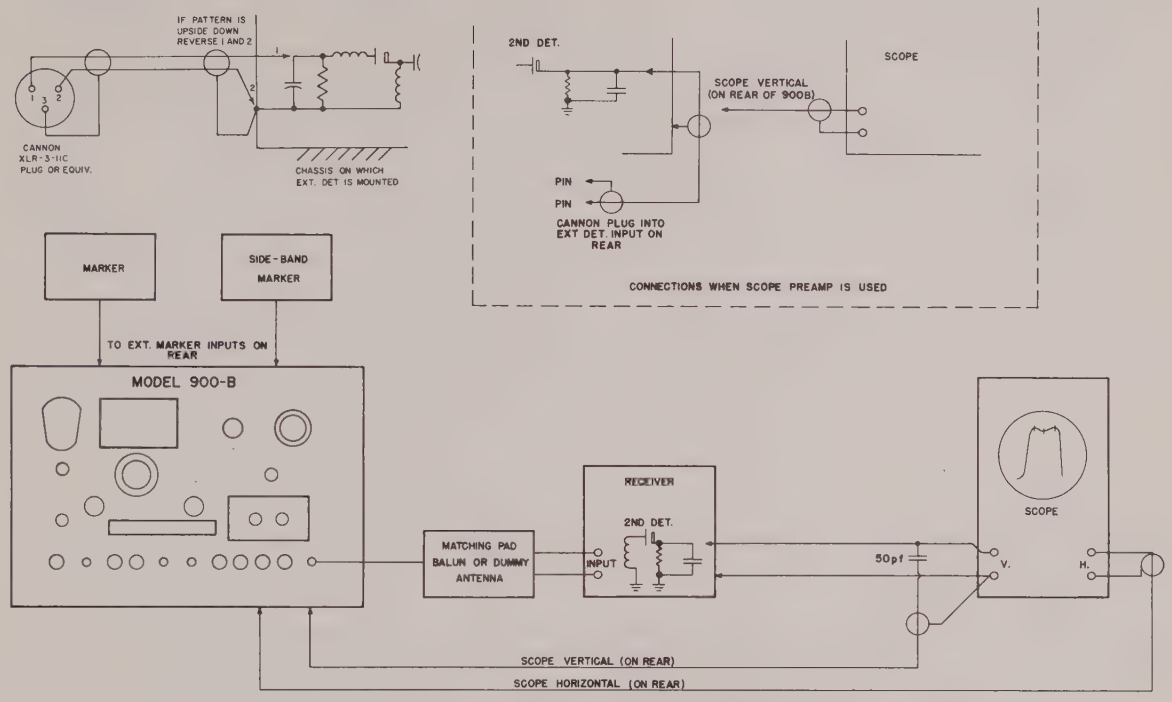


Figure 22—Testing a Complete Receiver

4-1 TESTING A COMPLETE RECEIVER (see Fig. 22)

a. **Receiver Input Connection**
Connect the output of the 900-B sweep to the receiver input terminals through an appropriate dummy antenna, matching pad, or balun as required. Where the range of the sweep's built-in attenuator is insufficient, an external attenuator may be added.

b. **Receiver Output Connections**
Receiver output for sweep testing is usually taken from the second detector. When the level at this point is above about 0.1 volts peak-to-peak, the gain of the built-in scope preamp is not needed and the receiver output should be connected directly to the scope's vertical input. The advantages of "birdy-bypass" markers markers may be retained in this case by coupling the scope output of the sweep through a small capacitor to the scope input as diagrammed in Fig. 22. With lower output levels the scope preamp is used, the connections being those shown in Fig. 22. In both cases, frequency marking may be obtained either from the 900-B's harmonic marker system, or from an external marker as described in the preceding section.

c. **AGC**
If the receiver has an AGC system, disable it and substitute a manually-varied bias control.

d. **Overload**
Use a weak input signal and high system gain to avoid overload which can distort the response curve presentation. To check for this distortion increase the attenuator setting by 10 db. If the curve shape changes radically, overload was present.

e. **Tuning**
Set sweep and receiver to same center frequency, and sweep width just wide enough to show the entire response curve. Note that weak responses will be seen when the receiver is tuned to a harmonic of the sweep, or when the sweep is at the image frequency of the receiver. If there is doubt, the strongest response is probably the right one.

f. **External Markers**
For band-center and band-edge markers, set marker generator at center frequency and side-band marker at a frequency equal to ½ the bandwidth of the receiver. Where pix and sound carrier markers are wanted (on a television receiver), set marker generator at pix carrier, side-band marker at 4.5 mc.

g. **Traps**
Where there are sudden changes in the response of the receiver (as, for example, when very selective traps are used to remove certain frequencies) the sweep may

move past these too fast for the second detector to follow accurately. To get a more accurate display, decrease the sweep width and shift center-frequency to cover only this section of the response.

h. **Spurious Response**
In the display of rejection notches, or other band-elimination characteristics, spurious components in the output of the sweep may cause erroneous response curves. This will be indicated when the shape of the displayed response curve changes as the RF OUTPUT is turned down. Where possible operate at reduced output settings to avoid this trouble.

4-2 TESTING THE RF SECTION OF A RECEIVER

a. Connect the Model 900-B output to the receiver input terminals as when testing complete receiver.

b. Connect the 900-B external detector input to the dc load of the mixer (see Fig. 23). This connection is often provided as a test point by the manufacturer.

c. Use high-level input with only enough attenuation to ensure a good impedance match (10 db step on attenuator).

d. Distortion of the response curve, preventing matching on the forward and return trace, can be caused by hum due either to the local oscillator (which can be temporarily disabled to check this) or to the method of connecting to the preamp input. In general, this test should be made with the local oscillator running, since its excitation affects the input impedance of the mixer, and thus the shape of the rf response curve. Use of 2 wire shielded leads with a separate ground connection from pin 2 to the receiver chassis near the 2nd detector often minimizes hum. (See Fig. 22.)

4-3 TESTING THE IF SECTION OF A RECEIVER

a. Connect to the second detector output, as described in b under Testing a Complete Receiver.

b. The output of the sweep should be introduced into the mixer circuit in some way that will give reasonably uniform response without greatly changing the output impedance of the mixer. One way of doing this is shown in Fig. 24. The output of the sweep is connected to a terminating resistor near the output terminal of the mixer, and is coupled to the mixer output loosely enough to avoid changing the tuning of the mixer output circuit.

c. It is important to introduce the if signal from the sweep in such a way that it does not result in added overall feed-back in the if circuits. The outer shield of the cable from the sweep should be carefully grounded to the chassis near the mixer. With ifs above 10 mc or so, it is preferable to attach the cable with a connection which brings it through the chassis. The presence of this type of feed-back is indicated if the if response curve differs markedly from the overall curve—with the usual broadly-tuned rf circuits.

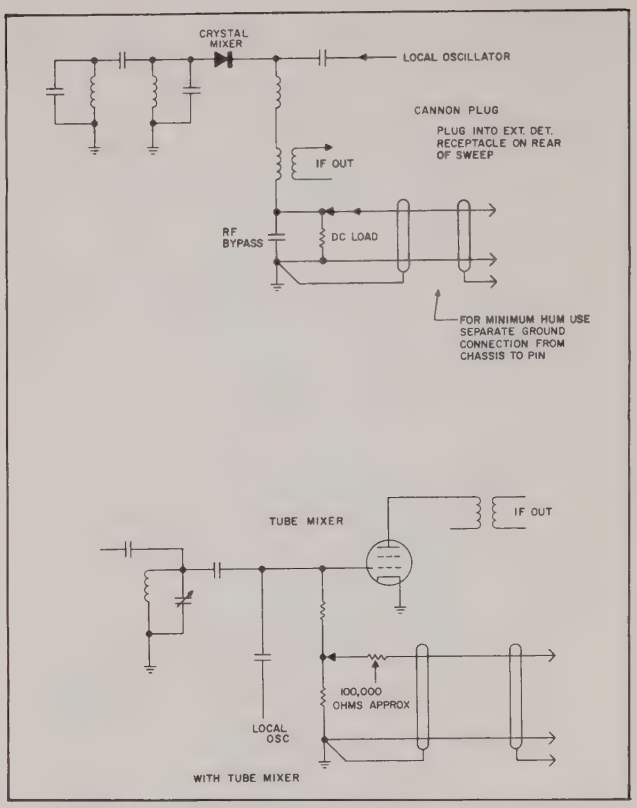


Figure 23—Testing the RF Section of a Receiver

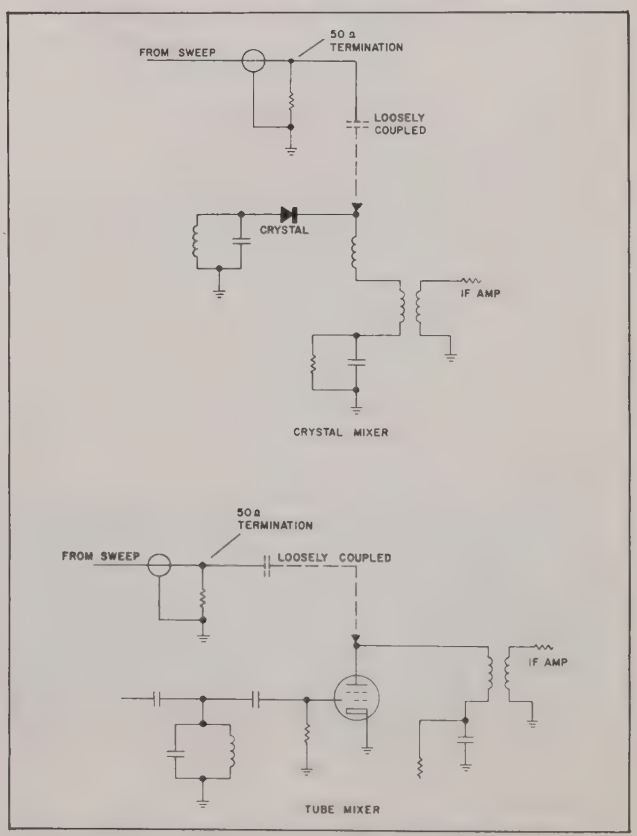


Figure 24—Testing the IF Section of a Receiver

4-4 TESTING THE FREQUENCY RESPONSE AND MEASURING THE GAIN OF AMPLIFIERS (see Fig. 25)

a. Connect the output of the sweep to the input of the amplifier, using a matching pad if the design impedance of that input differs from the source impedance of the sweep.

b. Connect the amplifier output to the sweep's built-in detector, with a termination on the detector's other terminal; again a matching pad is needed if impedances are not the same.

c. The dial calibration and the built-in markers of the 900-B provide a convenient way of determining the frequencies corresponding to any points on the displayed response curve. Where marks are wanted only at specific frequencies, as in production testing, use external markers at those frequencies; or a combination of markers making use of side-bands or harmonics as described in the section on Markers.

d. Use low sweep output, as much attenuation as possible and a high setting on the scope preamp GAIN control to avoid amplifier overload. (Set below the point where noise is bothersome.) Check for overload by reducing the level 10 db to see if the curve shape changes.

e. The approximate gain at any point on the curve may be determined by taking two steps: First, remove the amplifier from the circuit, connecting the input and output terminals (including match pads when used) together. With blanking ON reduce the attenuator setting until there is a conveniently measurable distance on the scope between the base line and the line representing full output. (See distance H2 on Fig. 25.) Second, reconnect the amplifier and note how much the setting of the attenuator (and the output of the sweep) must be changed to bring the response curve down to the position occupied by the "full output" line. (So H1 = H2, see Fig. 25.) The attenuation which must be added to bring the curve back to a given height is a direct measure of the amplifier's gain.

f. A great improvement in the accuracy of gain measurement can be accomplished by using a comparator switch (such as the Jerrold Model FD-30) to provide a continuous display of a reference line together with the amplifier's response curve. Euipment is connected as illustrated in Fig. 26. In one position of the coaxial switches the sweep output is connected through a reference attenuator to the detector input; in the other switch position the sweep output is connected through a variable attenuator to the amplifier input, and the amplifier output goes to the detector. When the switch is set to transfer 30 times per second a continuous display is formed, the line due to the reference circuit crossing the response curve at frequencies where the the amplifier's gain is equal to the difference between the loss of the two attenuators.

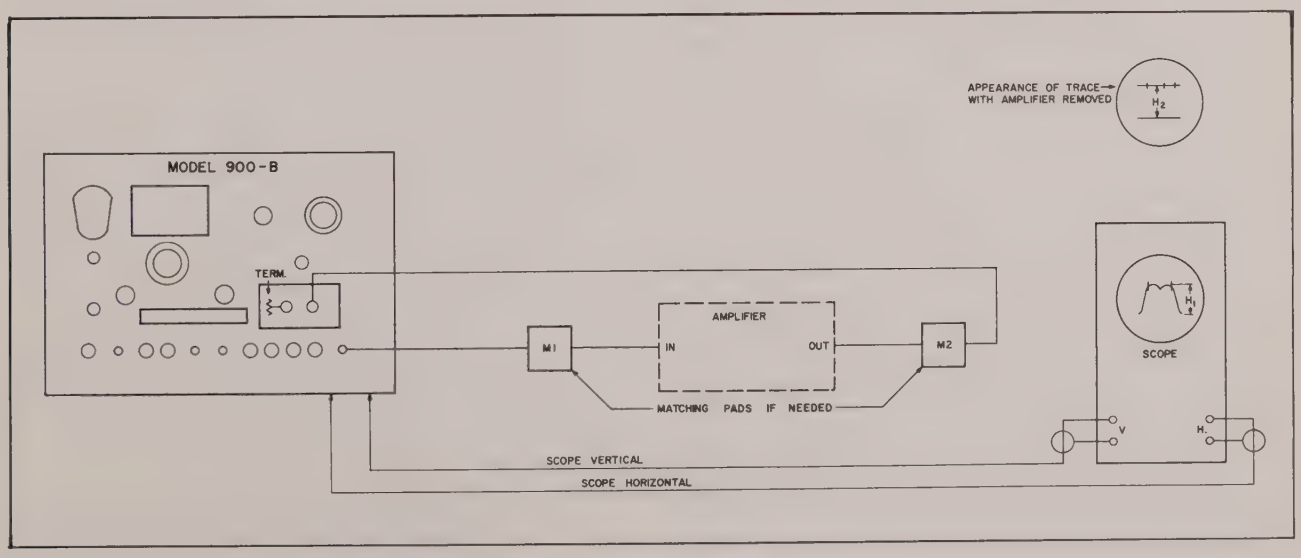


Figure 25—Testing an Amplifier

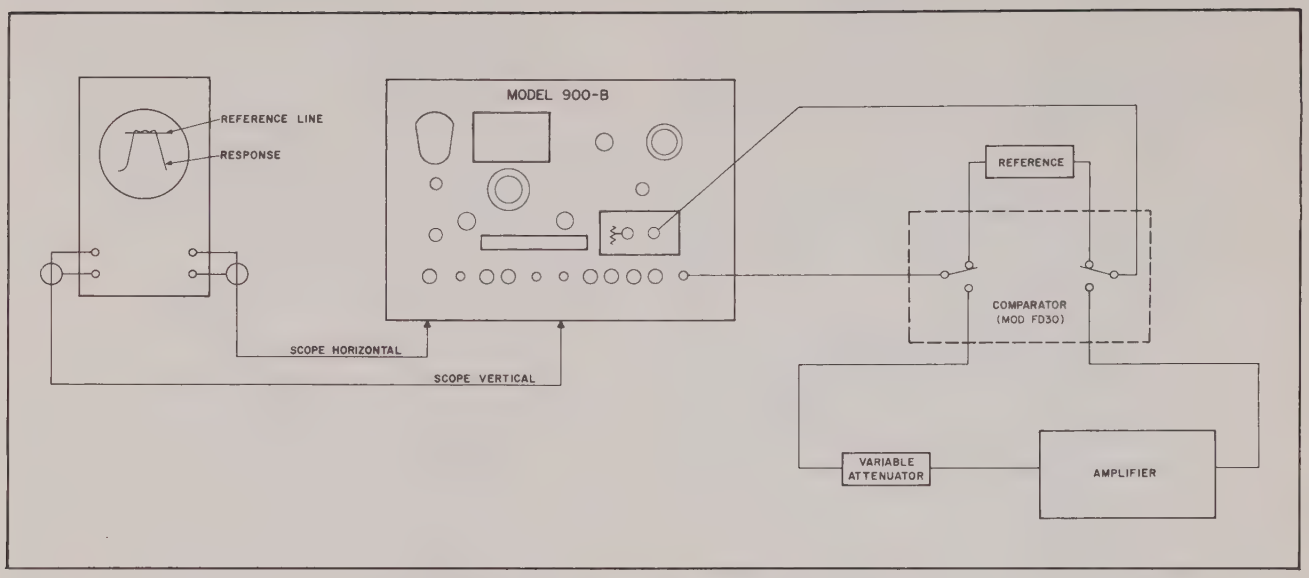


Figure 26—Testing Amplifier Gain with Comparator

4-5 TESTING A SINGLE INTERSTAGE IN AN AMPLIFIER

In development work, or in receiver testing, it's sometimes useful to be able to sweep the frequency response of a single amplifier interstage. To accomplish this, it is necessary to introduce the signal from the sweep and to take off the output in some way that does not materially affect the response of the interstage.

Method 1

One way to accomplish this, assuring good sensitivity and requiring no auxiliary amplifier, is illustrated in Fig. 27. The rf signal from the sweep is connected directly to the grid of the tube preceding the circuit to be tested, with minimum length connections. With no termination at the grid, this connection gives an input voltage which is constant out to about 200 mc (with 10 mmf input C, 50-ohm sweep, and minimum lead inductance). A small (6 to 10 db) attenuator pad inserted in the cable from the sweep will, in general, improve the accuracy of the response. A similar connection at the plate of the second tube gives an output voltage proportional to its grid voltage over a similar range. For critical work, the effect of the coupling capacitors, bypass capacitors, and connections can be checked by connecting to the plate of the first tube in the same way as shown for the second and observing any variation in the response of this much of the circuit.

Method 2

For some purposes a disadvantage of Method 1 is that the observed response does not include any effects due to feed-back around either of the two tubes, or from other stages in the amplifier. A second method gets around this difficulty, by the addition of an auxiliary amplifier whose response is flat beyond the response of the stage being tested.

The connections are diagrammed in Fig. 28.

The coupling capacitors C-1 and C-2 must be small enough to have negligible effect on the capacity and loading at these points, but large enough to give a response curve. One technique that gives a capacity in the order of 0.1 pf, is to tie a square knot between two pieces of #30 wire having low-loss insulation like Teflon or nylon.

Note: Any method of coupling signals in or out that depends on capacity coupling can be used only with narrow-band amplifiers (10% of center-frequency or less). In wider band amplifiers, the change of coupling with frequency introduces a deceptive tilt to the response curve.

With this connection, the effects of feed-back can be quickly checked. Varying the gain of the first tube, or shorting its grid circuit, will show whether there is any feed-back to earlier sections of the amplifier. Varying the gain of the second tube, or shorting its plate circuit will show whether there is feed-back from later sections of the amplifier.

A high-impedance probe can be used with a comparator set-up to provide accurate measurement of input or output circuit response and gain (or loss). For example, the set-up diagrammed in Fig. 29 allows measuring the bandwidth and gain of an input circuit. The voltage gain of the circuit would be the difference in reference attenuator settings to match the response obtained with the probe connected first to the input terminal, then to the grid. This technique is particularly useful in observing the performance of an input circuit with switched coils, to look for suckouts and gain changes as the circuit is tuned through its various ranges.

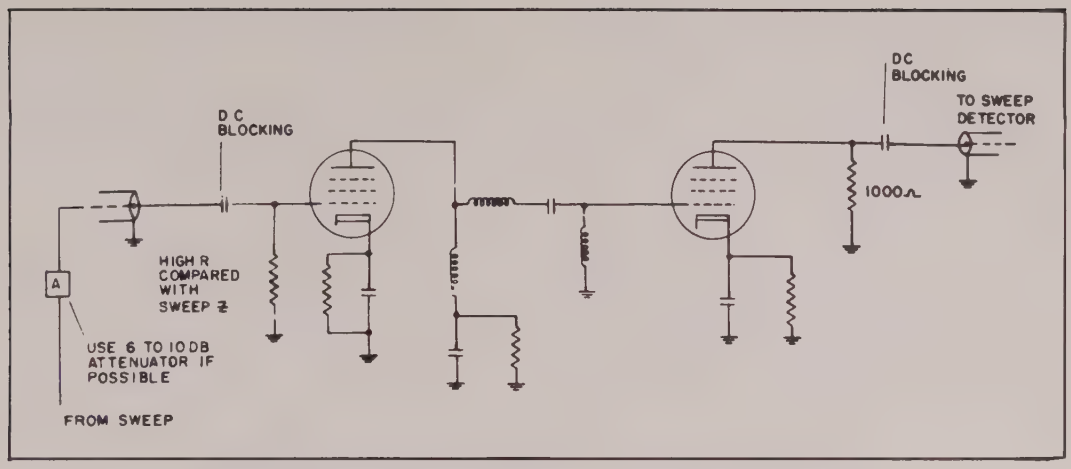


Figure 27—Testing Frequency Response of an Interstage Method I

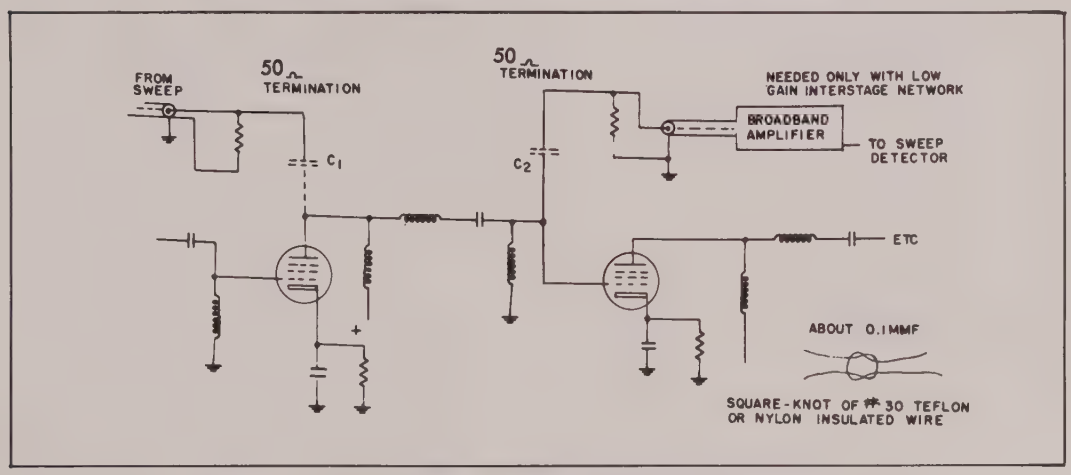


Figure 28—Testing Frequency Response of an Interstage Method II

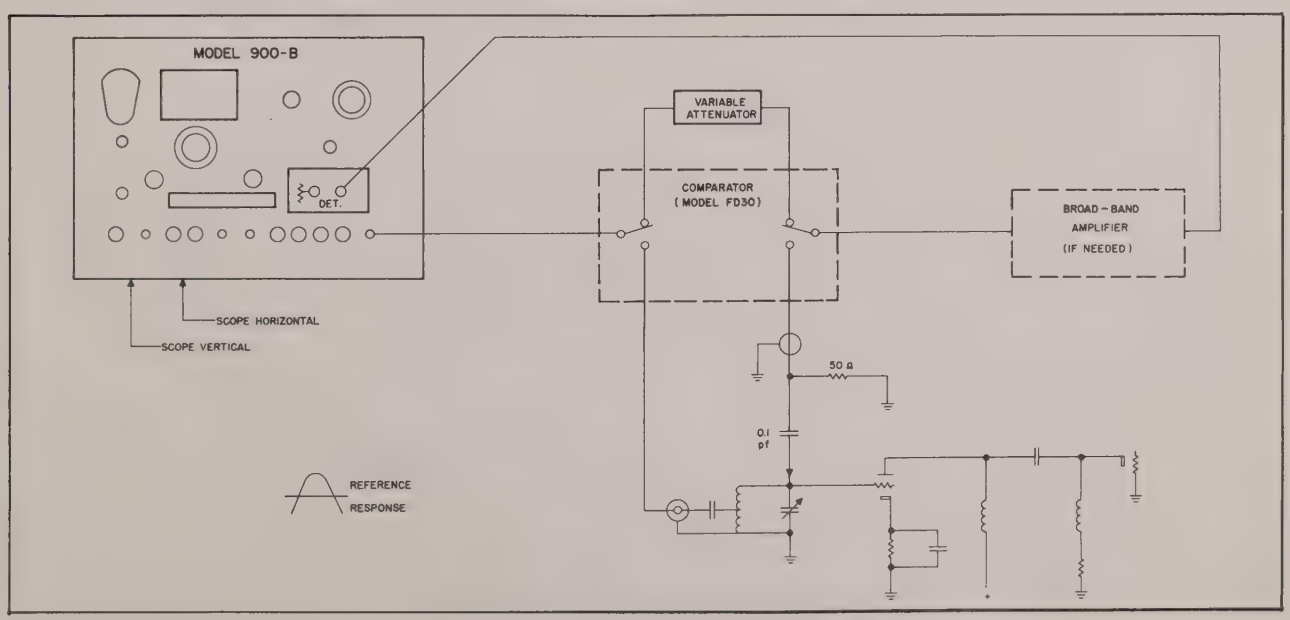


Figure 29—Measuring Bandwidth and Gain of an Input Circuit

4-6 TESTING THE FREQUENCY RESPONSE AND MEASUSING THE LOSS OF FILTERS AND TRANSFORMERS

a. The general technique for measuring passive circuits is similar to that employed for amplifiers, except that more system gain is required. Fig. 30 illustrates a typical set-up for displaying the response of a filter. When its terminal impedances differ from the sweep's, match pads (M1 and M2) are required.

b. The output level of the 900-B and the basic sensitivity of its detector and scope preamp allow displaying the response of devices with as much as 50 db loss. For higher loss, an additional amplifier covering the range of interest is required.

c. When deep rejection notches are observed within an octave band the effects of distortion in the sweep output can be minimized by the use of a low-pass filter cutting off just above the band, and by using the lowest setting of the RF OUTPUT control that will permit adequate display of the curve.

d. A transformer with secondary impedance differing from that of the primary can be tested by using match pads for each impedance; or by connecting two such transformers back-to-back to allow testing at a common impedance.

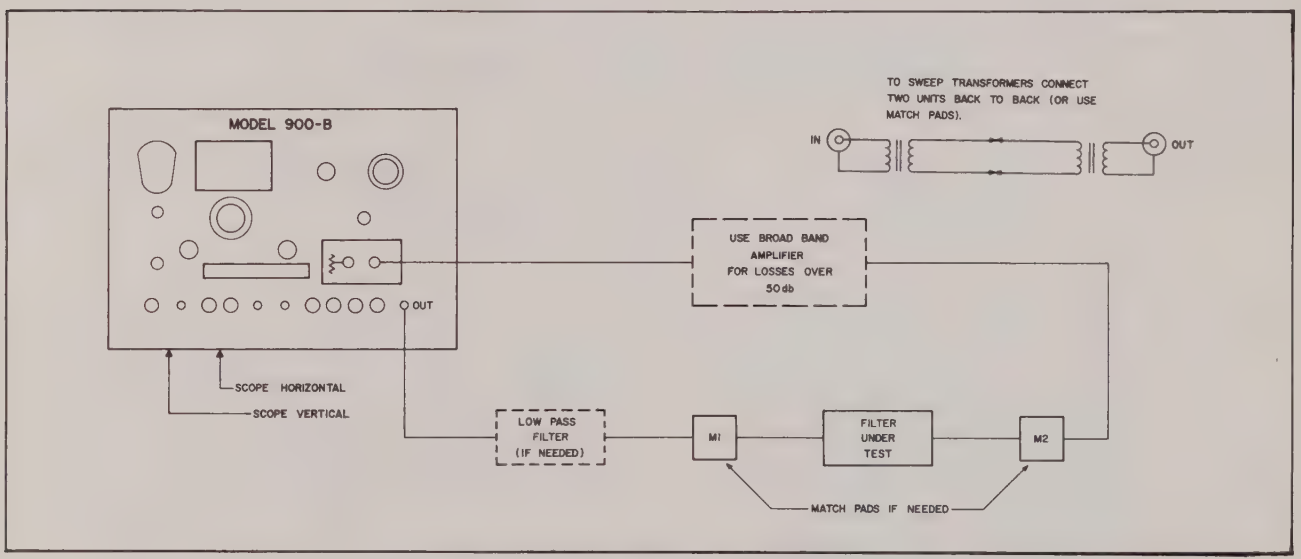


Figure 30—Testing Filters or Transformers

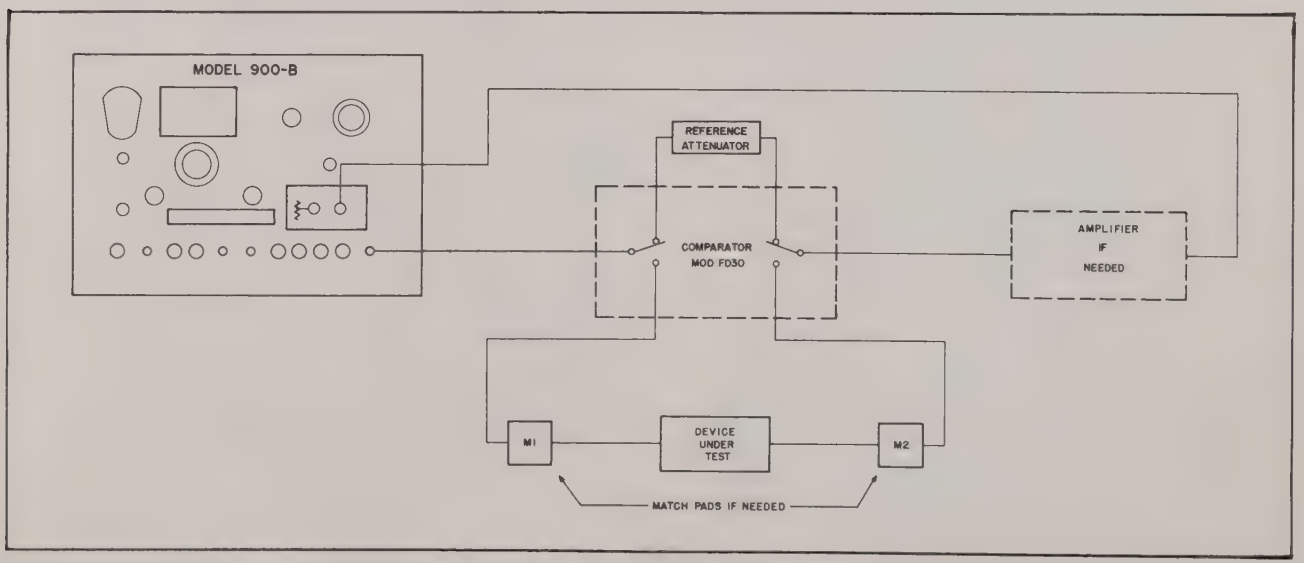


Figure 31—Testing Filters with Comparator

e. Accurate measurements of the loss of filters, transformers, or lengths of transmission line can be made using the comparator technique as illustrated in Fig. 31. With careful matching of the jumper cable lengths in the two branches and with accurate attenuators, measurements may readily be made with less than 0.1 db error.

4-7 MEASURING THE UNLOADED BANDWIDTH AND "Q" OF CAVITIES AND RESONANT CIRCUITS

a. With its stable narrow-band performance the 900-B provides an excellent way of observing and measuring circuits with small per-cent bandwidths. An example is the testing of UHF cavity resonators. The set-up is diagrammed in Fig. 32. The sweep output and the detector input are loosely coupled to the cavity under test. The bandwidth of the resulting resonant response is measured by using the side-band marker technique to determine the width of the curve 3 db down.

b. With good technique this measurement can be quite accurate (within a few per cent). Some points to watch: The probes load the cavity to the extent that they are coupled to it. Use the loosest coupling that will allow observation of the curve, and adjust both probes for approximately the same coupling.

As a rule of thumb, when the probes, in the cavity, give an insertion loss of 20 db (as compared with a direct connection) they introduce about 5% error in the bandwidth. If the loss is increased to 40 db, the error is reduced to about 1%.

In general, errors will be introduced when there is appreciable coupling directly between the probes. This can be checked by completely detuning or shorting the cavity, when there should be no measurable response. One way of avoiding this coupling is to use inductive coupling for one probe and capacitive coupling for the other.

The use of a side-band marker has the advantage that the error in bandwidth reading is simply the calibration accuracy of the low-frequency oscillator. Where precisely-calibrated high-frequency marks are available the 3 db frequencies may be measured directly.

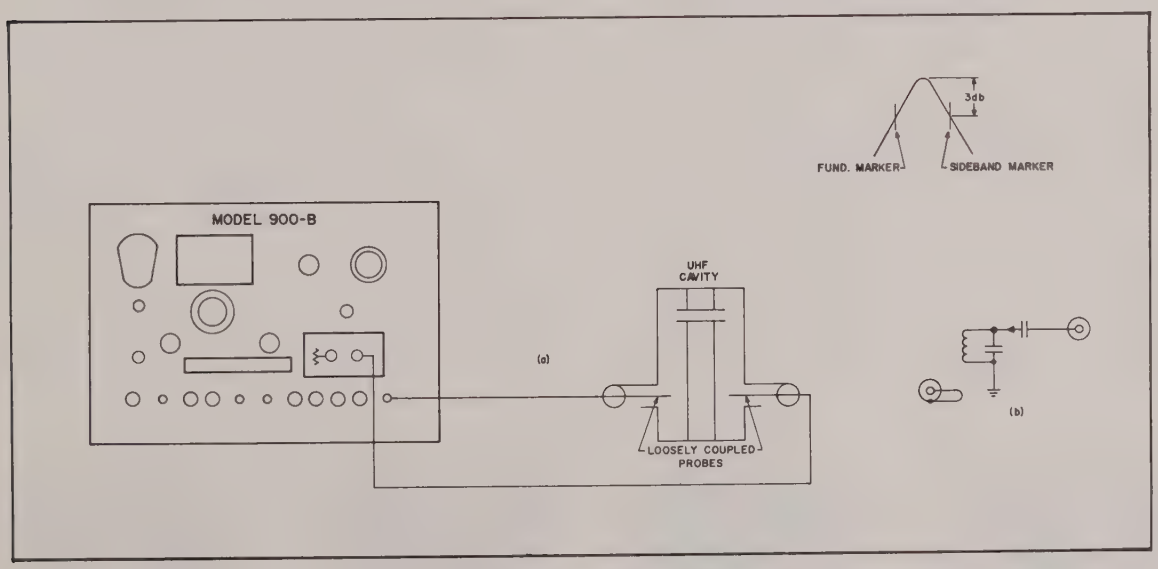


Figure 32—Measuring Cavity Bandwidth

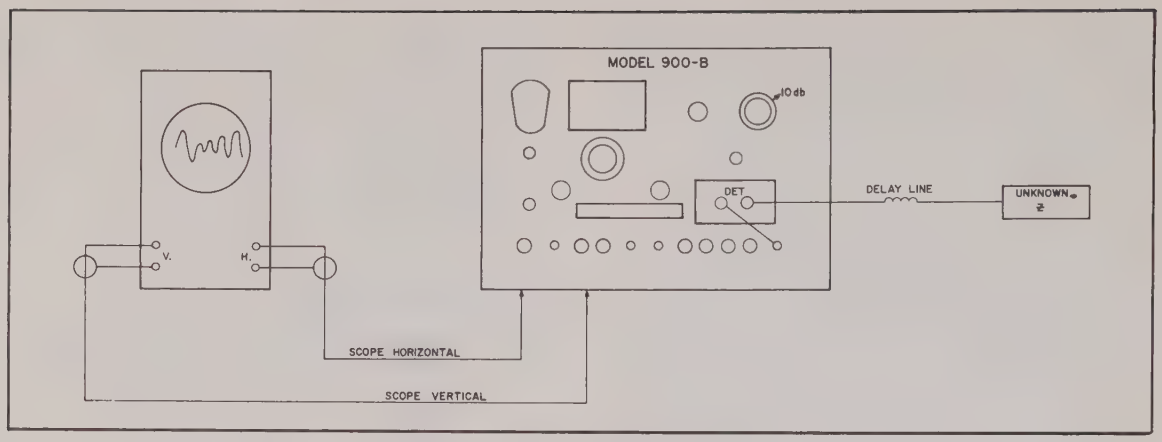


Figure 33—Impedance Testing with Delay Line

4-8 IMPEDANCE TESTING WITH A DELAY LINE

One of the most useful applications of a sweep is the testing of impedances to determine the degree to which they match a transmission line. Fig. 33 illustrates the connections. The attenuator on the sweep should be set for at least 10 db attenuation since the impedance presented to the sweep by the input end of a mismatched delay line varies so rapidly and over such extreme values, as to make proper ALC action difficult.

Figs. 34 to 37 inclusive show typical patterns obtained with this technique. With the sweep covering the 50-100 mc range and a thirty-three foot section of RG-11/U serving as the delay line, an open circuit at the end of the line gives maximum ripple height as shown in Fig. 34. Short-circuiting pattern produces a display similar to Fig. 35. A broadband termination gives a minimum ripple across the band (Fig. 36).

The degree of match is indicated by the ripple height at each frequency. Adjustments made to minimize ripple height will result in best match at corresponding frequencies. Fig. 37 shows the pattern with a load that matches only over a 6 mc section of the band being swept.

The spacing between adjacent peaks in the ripple pattern is determined by a length of the delay line; long lines having closely-spaced ripples are most useful for testing narrow-band circuits. The spacing between peaks in megacycles can be calculated from the following:

$$f = \frac{333}{\text{length in feet}}$$

For solid polyethylene cables.

$$f = \frac{492}{\text{length in feet}}$$

For air dielectric cables.

The height of the ripple pattern, for a given degree of mismatch, is determined by the total attenuation of the cable. When very long delay lines are used to test narrow-band circuits they must be made from low-loss cable.

For a more accurate and detailed report on impedance measurements, using the delay line technique, refer to Jerrold Technical Newsletter, Volume 1, Numbers 1 and 2.

Figure 34—Response with Open Circuit at End of Delay Line.

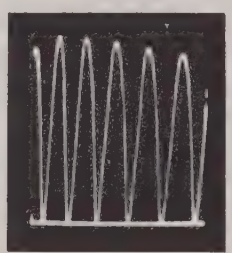


Figure 35—Result of Short-Circuiting Pattern.

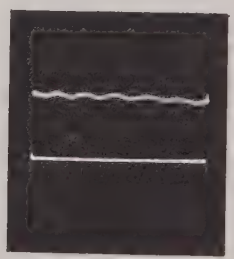


Figure 36—Response with a Broadband Termination.

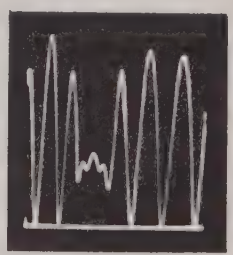


Figure 37—Response with a Load Matching Only a 6 MC Section of Swept Band.

Technical Description

5-1 **GENERAL**
(Please refer to Fig. 38—Block Diagram—Model 900-B, page 22 for clarification of this description.)

5-2 The heart of the Jerrold Sweep Signal Generator Model 900-B is the UHF sweep oscillator (275-1200 mc) which has three rf outputs.

5-3 One output is connected through the Band Selector UHF-VHF coax switch either directly to the RF OUTPUT terminal via an external marker mixer and an rf attenuator for UHF operation, or to a mixer where it beats with the 600 mc output of the fixed oscillator to form the VHF sweep output.

5-4 The second output feeds the UHF ALC (automatic levelling) detector. The dc output of this detector (or the VHF detector's output in VHF operation) operates the meter, and is amplified by the ALC amplifier as inverse feedback to maintain constant output.

5-5 The third output is introduced into the harmonic marker generator where it mixes with various harmonics of the 1, 10, and 100 mc generators. The resulting low frequency beats are controlled in amplitude, amplified by the marker amplifier and show up as "Birdy Markers" at the vertical input terminals of the scope. Marks may also be introduced by feeding external cw signals into the ext. marker inputs where they beat with the sweep output to form "Birdy" signals.

5-6 Line frequency energy from the power transformer is applied through the SWEEPWIDTH control to the voice coil of the wobbulator to drive a variable capacitor, which frequency-modulates the UHF sweep oscillator. Another line frequency output is filtered, phased and forms the horizontal deflection output to the scope. This signal is also applied to the blanking amplifier where it is amplified and clipped to form the blanking signal which can be used to turn the sweep off during the return trace.

5-7 The rf output of the device under test may be applied to the input of the built-in detector. The resulting detected signal is then amplified by the scope preamplifier and applied to the scope vertical input. The input of the scope preamplifier can be switched to an external detector to allow the advantages of amplification and marker mixing when an external detector is used.

5-8 **SPECIFIC CIRCUIT DESCRIPTIONS**
(Please refer to schematic diagrams at the rear of this manual for clarification.)

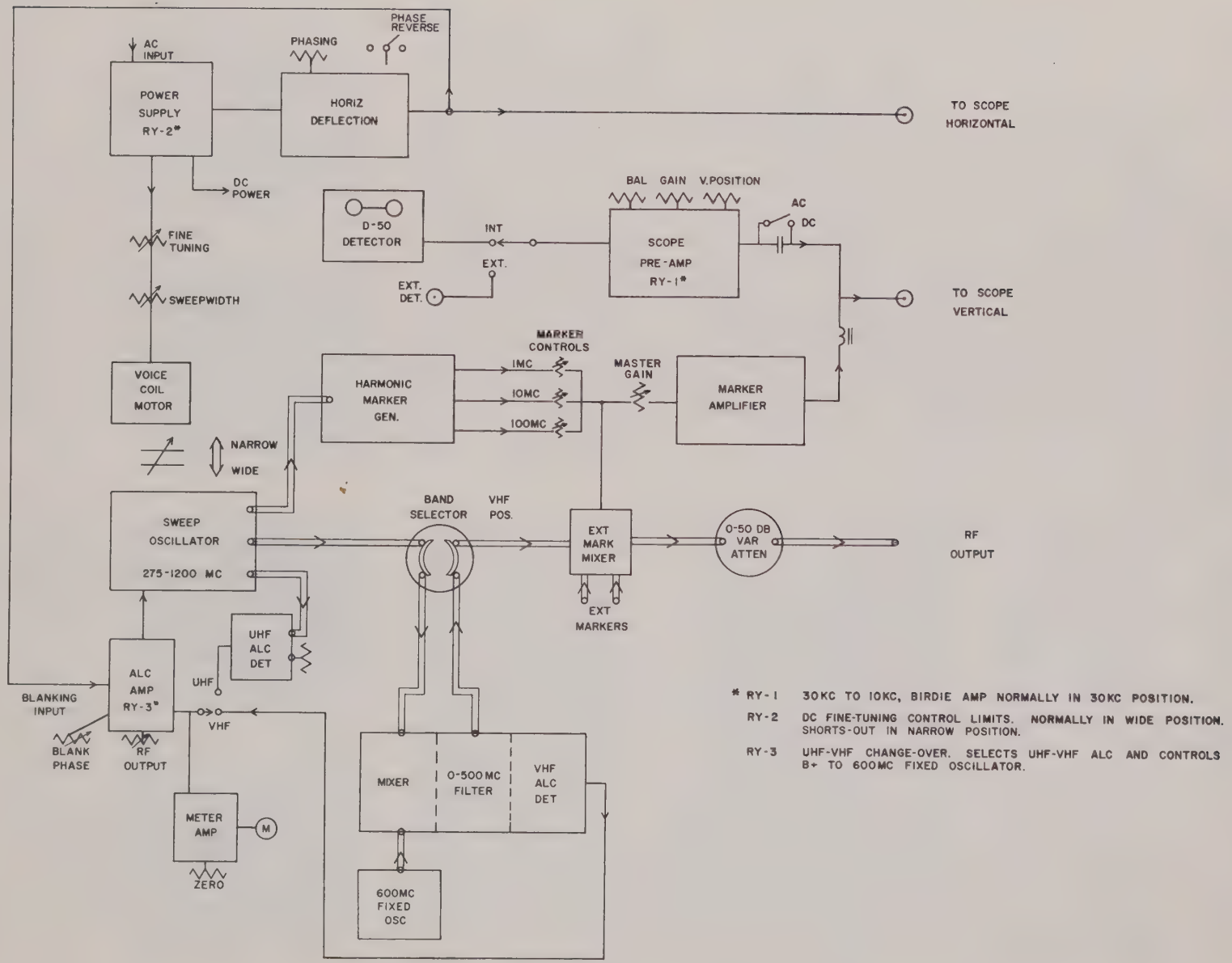
5-9 **UHF SWEEP OSCILLATOR** (see Fig. 59—RF CIRCUIT SCHEMATIC, a fold-out page at rear of manual)

5-10 The oscillator is a 5675 pencil triode in a grounded-grid circuit with capacitive feedback from plate to cathode. Frequency is determined by a high-Q resonant plate circuit. The inductive element is a ruggedly-built coaxial line section. The panel frequency control moves a low-inductance shorting plunger to vary the electrical length of this line and thus the center frequency of the sweep. This assembly has unique design features based on extensive life test. This design, with the meticulous care exercised in the manufacture, assembly and testing of the unit, assures exceptional freedom from contact problems.

5-11 Frequency modulation is accomplished by resonating the coaxial inductor with a variable air-dielectric capacitor connected across its open end. The capacitor's movable plates are mounted on a precisely-built voice-coil mechanism so that their position, and thus the instantaneous frequency of the oscillator, can be varied at the power line frequency. The moving plates float electrically, meshing with two sets of fixed plates to form a capacitor with minimum inductance and no moving pigtail connection to wear out.

5-12 When the WIDE-NARROW control is in the WIDE position, the moving plates of the capacitor are fully meshed to provide the large capacity change needed for wide frequency sweeps. Turning it to the NARROW position moves the entire wobbulator unit, withdrawing the capacitor plates so the capacity change resulting from a given motion is greatly reduced. This unique feature, together with the rugged construction of the entire tuned circuit, makes possible satisfactory operation at sweep widths of a few kilocycles, minimizing residual FM due to mechanical vibrations.

5-13 The grid disc of the pencil triode is clamped to a disc-shaped capacitor providing a low-impedance rf ground connection. To provide adequate feedback over the wide frequency range of this oscillator, a portion of the grid disc is removed. This allows the use of a low-inductance tab providing capacitive coupling from plate to cathode.



* RY-1 30KC TO 10KC, BIRDIE AMP NORMALLY IN 30KC POSITION.

RY-2 DC FINE-TUNING CONTROL LIMITS. NORMALLY IN WIDE POSITION. SHORTS-OUT IN NARROW POSITION.

RY-3 UHF-VHF CHANGE-OVER. SELECTS UHF-VHF ALC AND CONTROLS B+ TO 600MC FIXED OSCILLATOR.

Figure 38—900-B Block Diagram

A carefully designed choke in the heater and cathode supply maintains high and uniform impedance from cathode to ground, so that effective feedback is possible over the entire frequency range.

5-14 To maintain simplicity of construction and freedom from spurious resonances, the oscillator is operated with its plate at dc ground. Its cathode is connected to a negative supply through a 6CW5 output tube in the ALC amplifier, which varies the oscillator current and thus its output power for levelling purposes.

5-15 The three output probes are each terminated with built-in resistors to obtain good source-match and flat response. They are capacitively coupled to the resonant circuit, the degree of coupling being adjusted during assembly by threading the probes into the cavity.

5-16 In the UHF position the BAND SELECTOR UHF-VHF coaxial switch connects one output of the sweep oscillator to the RF OUTPUT connector through an attenuator providing 0 to 50 db attenuation in 10 db steps. A marker circuit couples to this output line to allow beating external signals with the sweep output to obtain birdy marks.

5-17 The second probe couples the sweep output to the UHF ALC detector. This uses two point-contact silicon diodes in a full wave circuit to obtain a rectified dc output proportional to the rf level in the oscillator cavity.

5-18 The third probe couples a small proportion of the oscillator output into the harmonic marker generator.

5-19 Pi filters, using ferrite beads and feed-through capacitors, provide a high degree of rf isolation in the supply leads entering the oscillator cavity. Electronic "weather-stripping" is used to seal all contact surfaces, so that direct radiation is reduced to a level allowing test of the most sensitive UHF receivers.

5-20 **VHF CIRCUIT**

5-21 When the BAND SELECTOR UHF-VHF switch is turned to the VHF position, the 900-B operates as a beat frequency oscillator. The output of the UHF sweep oscillator with its frequency set between 600 and 1000 mc, is applied through a band-pass filter to a balanced diode mixer using point-contact silicon diodes. This filter prevents low-frequency beat products from coupling back into the sweep oscillator and provides an impedance match from the 50-ohm input cable to the mixer diodes. Turning the band selector switch to VHF also actuates a relay. One contact of this relay applies voltage to a 5675 pencil triode which is used as a fixed frequency grounded-grid oscillator at 600 mc. This oscillator circuit uses silver-plated straps tuned by variable plunger capacitors to form resonant plate and cathode lines. Inductive coupling provides plate-to-cathode feedback.

5-22 The output probe of the fixed oscillator is capacitively coupled to the plate line and connects thru a short length of coaxial cable to a coupling loop in the mixer box. The 600 mc energy is filtered by using a resonant length of cable and tuning out the coupling loop reactance with a trimmer. The loop couples energy into a second resonant circuit which acts to provide a push-pull drive to the two diodes. This use of a balanced mixer with single-ended drive from the sweep oscillator and push-pull drive from the fixed oscillator provides a high degree of decoupling so that there is a minimum tendency for them to lock in at low difference frequencies. The use of a balanced mixer also minimizes even-order distortion components.

5-23 Output from the mixer is taken through a three-section low-pass filter, which passes frequencies up to 400 mc and greatly reduces output at higher frequencies. The VHF ALC detector is connected across the filter output and provides a rectified dc output proportional to the voltage level at that point. The ALC circuit acts to hold the voltage at this point essentially constant, regardless of load. Thus it acts like a zero impedance source and a match is obtained by connecting a 50-ohm resistor between this point and the output terminal.

5-24 The VHF output connects through the BAND SELECTOR UHF-VHF switch in VHF position and the variable attenuator to the RF OUTPUT connector on the front panel.

5-25 **AUTOMATIC LEVEL CONTROL CIRCUITS** (see Fig. 60 —ALC, BLANKING AND METER AMP SCHEMATIC, a fold-out page at rear of manual)

5-26 The output level of the sweep generator is held constant, with respect to frequency, by the automatic level control. Automatic level control is accomplished by an inverse feedback circuit which amplifies the dc output of the ALC detector and applies it with reversed phase to the sweep oscillator, reducing the output as the detector output increases. Variations in sweep output are reduced as the gain of the amplifier is increased, so high gain is desirable. The ALC amplifier is a high-gain, two-stage, direct-coupled amplifier using 6AU6 pentodes in the first stage and 6CW5 beam power tubes in the second. A balanced circuit is used to minimize the effects of supply voltage variation. The screen-cathode voltage and the reference voltage in the grid circuit of the first stage are stabilized with a voltage regulator tube.

5-27 The limitation on the amount of gain that can be used in the ALC amplifier is set by a tendency to break into audio oscillations when the gain is too high. High gain alone is not enough to ensure flat output. Another major factor is the degree of distortion in the output voltage.

5-28 Harmonics or spurious beats present in the output voltage add differently to the fundamental at the ALC detector than at the measuring detector, resulting in variations in rf output even though the ALC system holds the dc output of the ALC detector constant. Harmonic output in the UHF condition is minimized by careful placement and shielding of the probes. In the VHF condition it is minimized by adjusting drive levels and bias on the diode mixer.

5-29 **THE WOBBULATOR DRIVE CIRCUITS** (see Fig. 61—POWER SUPPLY SCHEMATIC, a fold-out page at rear of manual)

5-30 The capacitor plates that vary the frequency of the sweep oscillator are mounted on a voice-coil-driven loud speaker mechanism. To drive the wobbulator at line frequency, ac at high voltage level is taken from the power transformer and applied through a series limiting resistor to the SWEEP-WIDTH control. The use of a high-resistance potentiometer allows varying the amplitude of voice coil motion and thus the width of the sweep over a very wide range (1000 to 1). The output voltage from the SWEEPWIDTH control is coupled through a step-down transformer to the voice coil. A shunt capacitor resonates the transformer primary reducing its current and improving the voltage wave form.

5-31 The high side of the transformer secondary is connected to the voice coil, with a high capacity electrolytic connected between the low side and ground. Operation of the vernier tuning control supplies a variable dc voltage from the power supply across the voice coil, shifting its center position slightly. The electrolytic capacitor prevents the flow of dc current in the transformer secondary, and a choke in series with the output of the vernier tuning control keeps it from shunting the ac across the voice coil.

5-32 Vernier tuning requires a greater mechanical motion when the WIDE-NARROW switch is in NARROW position, so one contact of a relay actuated in this position shorts a resistor in series with the choke to provide the required increase in current.

5-33 The circuits feeding the voice coil are grounded to chassis at one point only, inside the modulator shield, to minimize chassis hum currents which would cause residual FM.

5-34 **HORIZONTAL DEFLECTION AND BLANKING CIRCUITS**

5-35 The ac output voltage of the Sola regulated power transformer is considerably distorted, resembling a square-wave more than it does a sine wave. Due to a combination of mechanical resonance and electrical filtering, the voice coil motion is sinusoidal with very little distortion. If the oscilloscope is to display with a linear frequency scale, horizontal deflection voltage must also be sinusoidal and be in phase with the voice coil motion. To obtain this voltage a high ac voltage from the secondary of the power transformer is connected through a large dropping resistor to the resonant primary of a transformer. This has a balanced secondary with the center tap grounded. The resonant transformer filters out the distortion, while the balanced secondary allows the use of a conventional RC phasing control to adjust the phase of the horizontal deflection output. A relatively high voltage level (20 volts peak to peak) allows full width deflection with scopes having low horizontal gain.

5-36 For many applications it is convenient to "blank" the output of the sweep. This reduces its output to zero during one of the two traces showing on the scope screen. Horizontal phasing is less critical under this condition and the zero output "base line" provides a convenient indication of zero response. The blanking signal should key the sweep output OFF precisely at one edge of the screen and ON again at the other. Since the edges of the screen coincides with the peaks of the horizontal deflection voltage, blanking phase will be automatically corrected if the blanking signal is derived from the horizontal deflection output.

5-37 As Fig. 60—ALC, BLANKING AND METER AMP schematic shows, the horizontal output is connected through a phase correcting network to the grid of the first section of the blanking amplifier. This section amplifies the sine wave input and clips the positive peak. This clipped wave-form is applied to the grid of the second section and results in a plate current which is square wave; i.e., this tube is cut off on one half cycle and conducts on the other. The plate of this tube is connected to the ALC amplier at a point where this flow of plate current disables the sweep oscillator, reducing the output to zero. During the half cycle when the plate current is zero, the ALC amplifier functions normally.

5-38 The blanking switch allows opening the cathode circuit of the second section to disable the blanking circuit when both traces are wanted. When the METER ZERO switch is

pushed, enough current is drawn to reduce the sweep oscillator output to zero to allow zero setting of the meter.

5-39 **METER CIRCUITS**

5-40 As has been mentioned above, the dc output of each ALC detector varies with the rf output level. To operate the output meter a balanced dc amplifier is used with high impedance input connected across the appropriate detector output. The meter is connected between cathodes through a variable resistance allowing factory calibration. High resistance in the cathode circuit stabilizes the amplifier against tube changes.

5-41 **DETECTOR AND SCOPE PREAMPLIFIER CIRCUITS** (see Fig. 62—PREAMP AND BIRDY AMP SCHEMATIC, a fold-out page at the rear of the manual)

5-42 A plug-in detector is provided on the front panel of the 900-B. It uses two silicon diodes in a full-wave circuit identical with those of the ALC detectors. This is important for flattest response because minor variations in the ALC detector response tend to be corrected by the ALC circuits. This is particularly effective at frequencies above 500 mc where there is a rise in detector sensitivity due to an approach to resonance. Since this affects both the ALC and the panel detector equally, the oscilloscope shows a flat response when using the plug-in detector.

5-43 To minimize hum the detector output is balanced to ground and is connected to the input of a balanced preamplifier having high rejection of unbalanced hum components. A switch allows the use of an external detector which may be plugged into the external detector receptacle. Either of the two inputs (V501 Pins 1 and 2) may be used as the "hi" side with the other grounded depending on polarity of the input signal.

5-44 The preamplifier is a "hybrid" direct coupled amplifier using two triode vacuum tubes in the first stage and two transistors in the second stage. The tube produces high input impedance and large current gain to the base of the transistor. There is a high voltage gain between the base and collector of the transistor. This is a PNP type, so the polarity of the base-to-collector voltage is opposite to the cathode-to-plate voltage of the triode. Thus the dc output of the transistor is close to ground potential. Inverse feedback is provided by a resistor between the collector of each transistor and the cathode of each tube, the degree of feedback and thus the amplier gain being controlled by varying the resistance between cathodes. A DC BAL control on the panel allows adjusting the cathodes to the same dc level so that gain adjustment does not shift the base line.

5-45 When the preamplifier is set near maximum gain (corresponding to less than a hundred microvolts dc per centimeter on the scope) there is a slow dc drift which would require occasional readjustment on scope vertical centering. To eliminate this an AC-DC switch is provided which in AC position inserts ac coupling between the preamp and the output circuits. Excellent line frequency square wave response is maintained in the AC position by a carefully designed compensating circuit. In either the DC or AC position a DC LEVEL adjustment is provided so that scope vertical centering can be corrected. A cathode follower provides a high load impedance for the amplifier and minimizes the effect of scope input capacitance on frequency response.

5-46 **HARMONIC MARKER CIRCUITS** (see Fig. 63—HARMONIC MARKER SCHEMATIC, a fold-out page at the rear of the manual)

5-47 The internal marker system in the 900-B generates markers at all harmonics of 1, 10, and 100 mc within the frequency range of the sweep. The UHF output of the sweep generator is mixed individually in three separate diodes with harmonic-rich signals at each of these frequencies. This technique allows the use of separate audio gain controls to adjust the height of the three sets of marker signals.

5-48 The basic frequency standard in the marker generator is a 5 mc crystal-control oscillator, V401A. Its output splits two ways. A 5 mc resonant circuit is mutually coupled to the oscillator plate circuit and applies energy to the 1 mc blocking oscillator (V401B), causing it to synchronize at 1/5 of the crystal frequency. The blocking oscillator output, very rich in harmonics, goes through CR1, the 1 mc shaper diode, which acts to increase the uniformity of harmonics. The resulting spectrum is mixed in the 1 mc mixer diode with the output from the UHF sweep oscillator, producing an audio beat each time the sweep frequency passes through a multiple of 1 mc. This audio beat goes through J1 to the 1 MC gain control. A second output is taken directly from the grid of the 5 mc oscillator to V402, the 5 mc doubler. Its plate circuit is resonated to 10 mc and again splits two ways. One output drives CR3, the 10 mc shaper diode, to produce a spectrum of 10 mc harmonics which mixes with the UHF sweep output in CR4 to produce birdies at harmonic multiples of 10 mc. A second output feeds the grid of V403A, the 10 mc quintupler. Its plate circuit is resonated at 50 mc and drives the doubler,

V403B, whose plate circuit is tuned to 100 mc. This 100 mc output is shaped by CR5, mixed in CR6 with the sweep output and the resulting audio beats go to the 100 MC gain control.

5-49 CW signals from external marker oscillators, when they are used, are mixed with the sweep output in the external marker mixer diode. The resulting audio beat is mixed with the outputs of the three marker gain controls and a fourth potentiometer acts to control the level of four sets of markers. The combined signal goes to the input of the birdy amplifier.

5-50 **BIRDY AMPLIFIER**
(see Fig. 62—BIRDY AMP SCHEMATIC)

5-51 Each time the frequency of the sweep passes that of a marker signal an audio beat is produced starting at high audio frequencies, going down through zero beat and back up the other side. The amplitude of the resulting signal is determined by the audio response of the circuits following the marker mixer diodes in the birdy amplifier. Experience has shown that the most usable mark on the scope is obtained when the birdy response is peaked at some moderate audio frequency, the response falling to zero at low frequencies and at extremely high frequencies. This response shape is obtained by tuning the birdy amplifier. This is a two-stage amplifier providing high gain to increase the level of the birdy signals and including the required audio peaking. It has two conditions of operation, providing a birdy signal peaked at approximately 30 kc when the sweep is in the WIDE condition and at approximately 10 kc in the NARROW condition. This change is accomplished by relay RY-1 which switches capacitors in the plate circuits of the two tubes. The output of the second tube goes through a step-down transformer, the secondary being connected in series with the output of the scope preamp cathode follower. This inserts the marker signals into the vertical input of the scope without disturbing the preamp response characteristics.

5-52 **THE RELAY INDICATOR CIRCUITS**
(see Fig. 61—POWER SUPPLY SCHEMATIC)

5-53 Three relays are used in the 900-B. Relays 1 and 2 are actuated when the WIDE-NARROW switch is in the NARROW position. RLY-1 switches capacitors into the plate circuit of the birdy amplifier to lower the marker peak frequency for NARROW sweep operation. RLY-2 shorts a resistor in the vernier tuning circuit to increase the range of a current variation through the voice coil. RLY-3, located on the ALC chassis, is actuated when the BAND SELECTOR UHF-VHF switch is in the VHF position. These contacts switch the ALC and meter amplifier inputs from the UHF ALC detector to the VHF ALC detector. A second contact applies +275 volts to actuate the 600 mc fixed oscillator in the VHF condition. The indicating arrows associated with the frequency dial are illuminated to indicate the scale in use. The circuitry required is shown on the schematic diagram. Any one of the four pairs of neon bulbs is lit, depending on the positions of the two switches.

5-54 **POWER SUPPLY**

5-55 Power for the 900-B sweep generator is provided by a Sola regulated power transformer. Primary switching is provided to allow operation from either 115 volts or 230 volts ac mains. A series of taps on the secondary windings allow changing from 60 to 50 cycle operation by removing a Jones plug from one receptacle and plugging it into another. Silicon diode rectifiers are used, together with a two-stage filter in the positive supply to minimize hum. Gas tube regulators provide additional stabilization of the 150-volt supplies. Three heater supplies are provided, suiting the requirements of each of the various circuits. Unbalanced (1 side/ground) heaters are used in the harmonic generator where rf grounding is critical and hum is less important. Balanced (center tap grounded) heaters are used for the ALC chassis, and a second balanced heater supply is provided for the UHF sweep oscillator. A dc filament supply, using a silicon rectifier and large electrolytic capacitors, is used for the scope preamp to minimize hum. A second low voltage dc supply provides current for the relays and the fine tuning circuits.

Maintenance

6-1 GENERAL

6-2 The five schematics located in the rear of this section identify all the electronic components in Model 900-B. A replacement parts list, complete with schematic designations and descriptions of each part, precedes the schematic diagrams. Photographs showing the physical location of electronic components, a trouble shooting chart, voltage and resistance charts, and pertinent data on replacement of crystals and oscillators together with necessary alignment and calibration procedures are included in this section for the guidance of the experienced electronic technician.

6-3 SERVICE

6-4 In the event of equipment malfunction, the best procedure is to immediately contact Jerrold's Instrument Service Department. Give the serial number of the particular instrument and outline all characteristics of the trouble. Either information for correcting the trouble will be given or authorization will be granted to return the instrument to the factory.

6-5 RETURN OF EQUIPMENT FOR SERVICE

6-6 All equipment returned to Jerrold should be properly identified with a tag, carefully packed, and shipped via express prepaid. Unidentified equipment is a serious source of error and delay.

6-7 TROUBLE SHOOTING CHART

6-8 TABLE IV (pages 46-49) lists various symptoms of trouble in the 900-B and lists the components that should be checked.

6-9 RESISTANCE MEASUREMENTS

6-10 TABLE V (page 50) gives the resistance measurements for the tubes of 900-B.

6-11 VOLTAGE MEASUREMENTS

6-12 TABLE VI (page 50) gives the voltage measurements for the tubes of the 900-B.

6-13 CRYSTAL DIODE REPLACEMENT

6-14 GENERAL

6-15 There are 8 K3-A crystals used in various circuits in the 900-B that will need replacement from time to time. These include CR-101 and 102 located in the UHF ALC detector, CR-701 and 702 located in the mixer, CR-703 and 704 located in the VHF ALC detector, and CR-901 and 902 located in the removable detector D-50.

CAUTION: REPLACE CRYSTALS ACCORDING TO POLARITY AS INDICATED ON PERTINENT SCHEMATIC. THE BLACK BAR ON THE CRYSTAL BODY IS POSITIVE OR +.

6-16 REPLACING CRYSTALS IN D-50 AND UHF ALC DETECTORS

6-17 Step-by-Step Procedure

1. Remove 8 screws in front panel of detector.
2. Take hold of the panel and withdraw it from the body, giving a slight side to side rocking motion. It must be drawn out straight to disengage crystals from their holders.

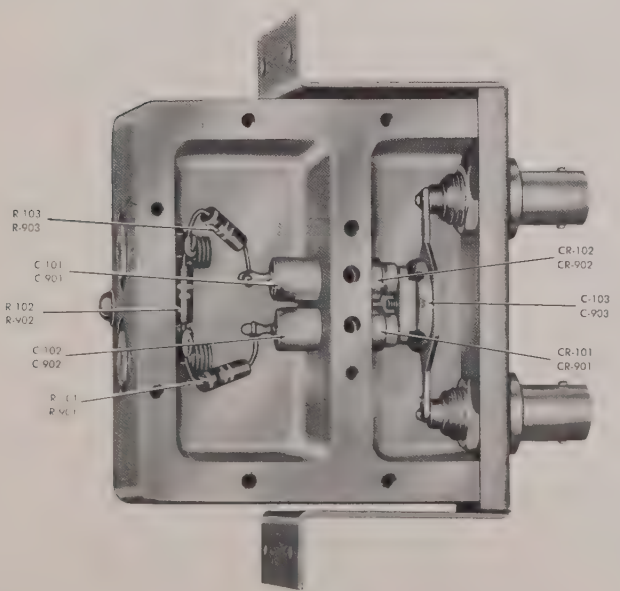


Figure 39—Plug-in and UHF-ALC Detector with Cover Removed

3. When replacing crystals, observe polarity as indicated on cover and rear of casting.
4. Insert crystal body into clip on panel first before trying to put the panel back onto the body. With the crystals installed in the dual clip on the panel, enough of the crystal body will protrude to enable you to see that the crystals are positioned into the shield barrel openings before pushing the panel tight. If any difficulty is experienced in replacing crystals in this fashion, it is permissible to remove the top cover, which will reveal the entire detector. It should not be necessary to disturb the position of the filter barrels.

6-18 **REPLACING MIXER CRYSTALS**

6-19 **Step-by-Step Procedure**

1. Remove the four screws that secure the small cover to the mixer.
2. It will be observed that inside of this housing there is a sub-assembly plate held in place with three screws (two are holding down the insulator and one is located between the fixed capacitors at the other end). Remove these screws.
3. Lift the coupling loop from the connector up and out of the way.
4. Lift the sub-assembly plate enough to disengage the crystal diodes from their clips and maneuver the plate out of the housing. If necessary, remove the cross bar to give more access.
5. Observe the polarity of the crystal diodes and replace the crystals in the dual clip in the mixer body first (not in the removable plate).
6. Replace the removable plate, being careful to see that the crystal clips engage the crystals.
7. Replace the 3 screws, using the two longer ones in the insulator and the shorter one between the fixed capacitor.
8. Bend the coupling loop down towards the tuned circuit.
9. After installing the new mixer diodes, certain adjustments (see 6-22, 6-23) will have to be made to the filters in the mixer box because of the change of capacity and impedance of the diodes. The circuits affected are the UHF tuned circuit, the high pass filter and the bias resistors.

6-20 **REPLACING VHF ALC CRYSTALS**
(Located under the round plate attached to body of mixer)

6-21 **Step-by-Step Procedure**

1. Remove the four screws attaching this plate to the mixer body.
2. Gently pry the plate off, using a knife or small screwdriver.
3. Observe polarity (plus or bar of crystal towards the red dot on the filter barrel; the other crystal is put in the opposite way).
4. Insert the crystals first in the dual clip inside the mixer body.
5. Replace the round plate, being careful to check the RF weather-stripping to see that it is in the machined groove.

Note: If difficulty is encountered replacing crystals in the clips which are inside the mixer body, it is permissible to remove the large cover (3 screws) which will enable the operator to see the clips better.

6-22 **TOUCHING UP MIXER ALIGNMENT AFTER CHANGING CRYSTALS**

6-23 **Step-by-Step Procedure**

1. Disconnect 900-B from power source.
2. Open cover (if bench-mounted) or remove from rack (if rack-mounted).
3. Remove both covers from mixer housing.
4. Remove resistors R-702 and 703 and replace each with a 250-ohm potentiometer.
5. Connect 900-B to oscilloscope and to a power source. Adjust controls to display entire VHF range (0 to 450 mc) on oscilloscope screen with zero beat on the extreme left of the screen. Use internal markers to insure that the entire range is covered.
6. Turn RF OUTPUT extreme cw to remove ALC.
7. Set potentiometers installed in step 4 to get a response across the entire band as high in amplitude and as flat as possible.
8. Tune capacitors C-701 and 702 (located inside the mixer housing) in turn until the zero beat end of the response is at maximum amplitude and as flat as possible.
9. Tune capacitor C-703 (located at the end of the mixer housing) with a screwdriver from the outside until the high frequencies start to cut off at 450 mc and this end of the response is as flat as possible.
10. Push BLANKING control IN and adjust coupling loop L-710 to obtain .25 volts output as observed on rf output meter.
11. Pull BLANKING control OUT.
12. Adjust capacitor C-716 for maximum amplitude, (if 2 maximum points are found adjust to middle).
13. Adjust trimmer capacitor C-715 attached to coupling loop to peak, slightly off resonance but not enough so to seriously affect the amplitude of the VHF signal.
14. Turn RF OUTPUT control ccw until response flattens, indicating that ALC is operating. Turn off markers and examine response for tiny beats in the response curve. Adjust potentiometers installed in step 4 to minimize these beats. Measure the resistance in each potentiometer. Disconnect 900-B from power source and oscilloscope and replace each potentiometer with a fixed resistor of the measured value.
15. Replace covers on mixer housing. Connect 900-B to power source.

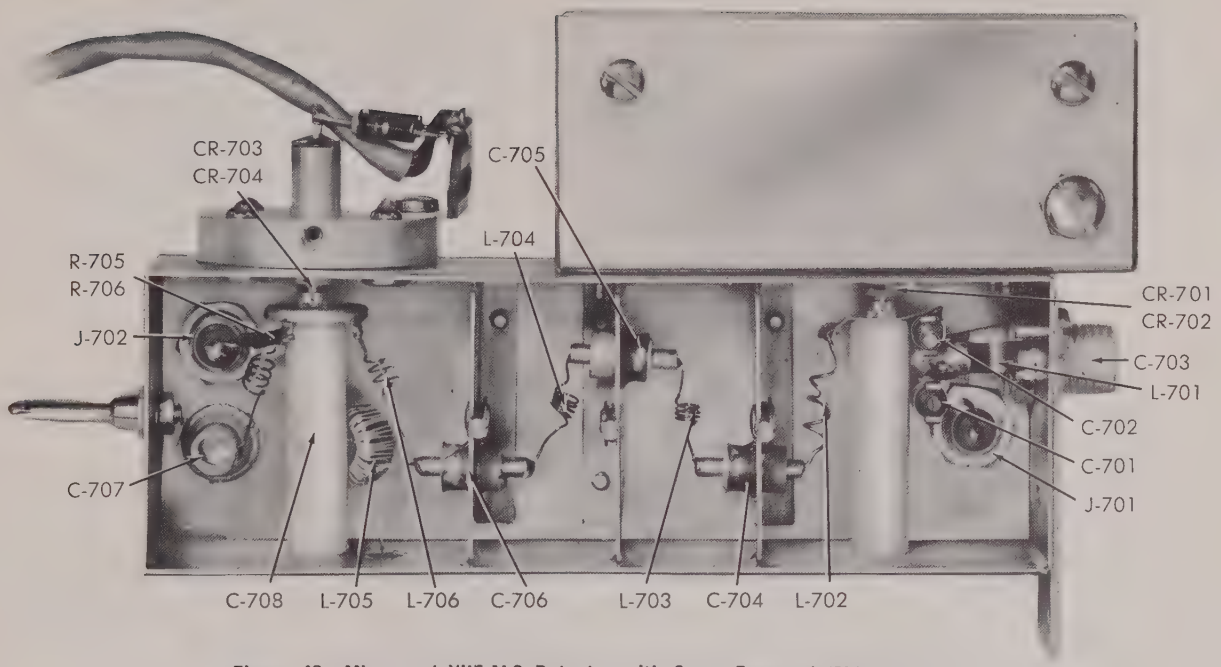


Figure 40—Mixer and VHF-ALC Detector with Cover Removed (Side View)

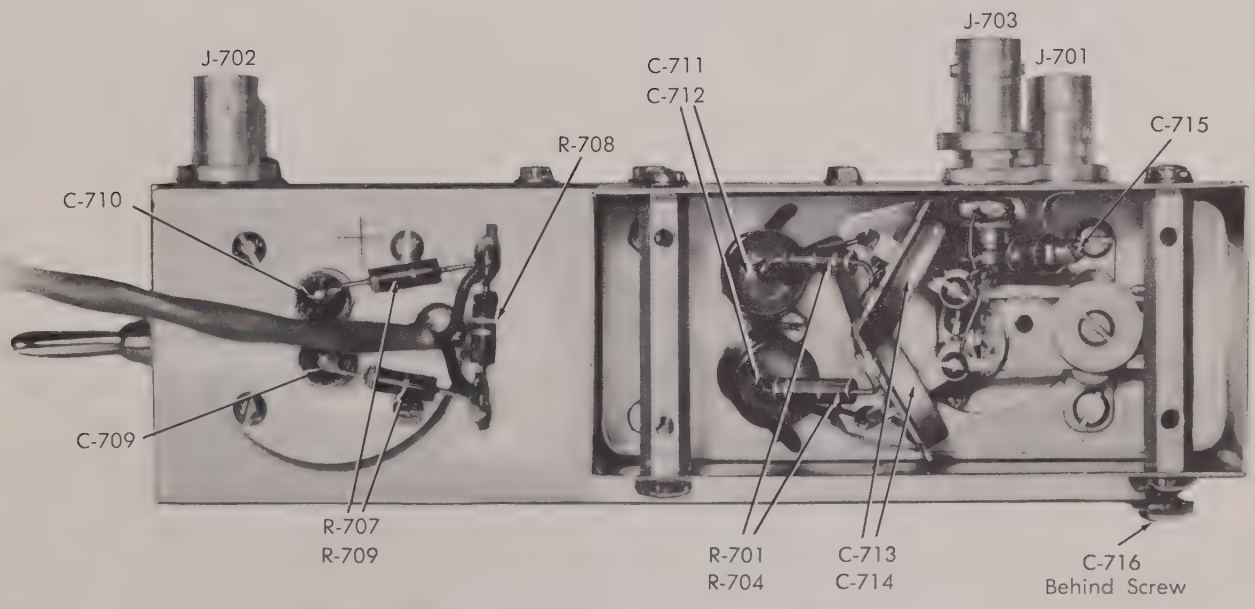


Figure 41—Mixer and VHF-ALC Detector with Cover Removed (Top View)

16. Check alignment of fixed (VHF) oscillator V-201 per paragraphs 6-26 to 6-27.
17. Close cover (if bench-mounted) or replace in rack (if rack-mounted).

6-24 REPLACEMENT OF FIXED (VHF) OSCILLATOR V-201

6-25 Step-by-Step Procedure

1. Remove 900-B chassis from cabinet or rack.
2. Remove 4 screws from fixed oscillator housing located underneath chassis.
3. Remove housing by guiding it out of the mounting channels. Slide back "finder tube" which permits fiixed oscillator adjustment from the front panel to clear trimming adjustment. (If necessary, unsolder B+ and filament lead from oscillator housing.)
4. Grasp the tube at the ends and gently pry up until it is freed from the spring clips by which it is mounted on the housing.
5. Cautiously pull the filament socket from the tube.
6. Insert the filament pins of the new 5675 tube into the filament socket.
7. Carefully insert the new tube into the mounting clips, being sure that the grid flange of the tube is lined up correctly with the grid clip before pushing the tube gently but firmly into place.
   Note: If the clips seem to be sprung open too far, squeeze them shut to insure that the tube will be held securely.
8. Replace housing and tighten 4 mounting screws. Reposition finder tube.
9. Reconnect filament leads (if they were removed). Temporarily connect a 0-100 ma dc meter in series with B+ lead to monitor plate current drawn by the oscillator tube. Check current as unit is turned on. If meter reads 20 ma or more it indicates that the tube is not oscillating. As soon as possible adjust "cathode tuning" for minimum plate current or "null." Normal operation of fixed oscillator calls for a plate current of 8 to 12 ma.
10. Check alignment of fixed oscillator per paragraphs 6-26 to 6-27.

6-26 ALIGNMENT OF FIXED (VHF) OSCILLATOR V-201

6-27 Step-by-Step Procedure

1. Disconnect lead from FB-202 and connect milliameter between the lead and FB-202. Set milliameter on 100 ma scale.
2. Tune UHF circuit in mixer per steps 1, 2, 5, 6, 8, 9, 10, 11, 12 and 14 of paragraph 6-23.
3. Center zero beat on screen and set SWEEPWIDTH control to 3 mc.
4. Switch 100 MC marker ON.
5. Check range of oscillator adjustment on front panel (C-205). Should be 3 mc.
6. Adjust PLATE TUNING capacitor C-206 to bring zero beat and birdy marker together.
   Note: Do not adjust zero beat to land in the middle of the marker birdy. Slightly offset the fixed oscillator to one side.
7. Read meter. Adjust C-201 for minimum plate current and then repeat step 6. If plate current is now between 8 and 12 ma the adjustment is complete.

6-28 REPLACEMENT OF VARIABLE SWEEP OSCILLATOR TUBE V-601

Note: This is a delicate operation and should only be attempted by trained personnel with proper equipment if there is no way to return the unit to the factory.

6-29 Step-by-Step Procedure

1. Remove chassis from cabinet.
2. Remove four screws from end plate of sweep oscillator housing and remove cover.
3. Unsolder leads from filament wires of tube, using a small soldering iron.
4. Loosen three screws (with teflon shoulder washers) that clamp grid flange of tube. One or two turns is sufficient. When screws are loosened, turn the teflon shoulder washer so the flat lines up and allows the tube to be withdrawn. See Fig. 44.
5. It will be noticed that a fourth screw and washer is positioned on the flange but this need not and should not be removed or loosened.
6. Gently withdraw the tube straight out by grasping the cathode sleeve with two fingers.
7. At this point, an examination will reveal a spring contact cylinder inside the center rod. Before a new tube is inserted, it is important to push this in with the finger to make sure it seats properly. Failure to do this will prevent the new tube from going in fully and may result in breakage when tightening the grid flange.
8. When looking into the cavity, the open part of the spring contact cylinder should be at a 9 o'clock position.
9. The new 5675 tube is furnished complete with cathode sleeve and feed-back tab attached. It should be gently inserted plate end first into the spring finger contact, being careful that the feed-back tab is positioned so as to feed into the opening of the spring contacts. It should be pushed straight in and gently seated. If the grid flange of the tube does not set flush on the metal ring, it usually indicates that the spring contact cylinder was not pushed in far enough before the tube was inserted.
10. Turn the teflon shoulder washers so as to clamp the tube flange and tighten the screws alternately so as to distribute the pressure. Never over-tighten—just firmly tighten, keeping in mind the size of the screw and the flexible teflon washer.

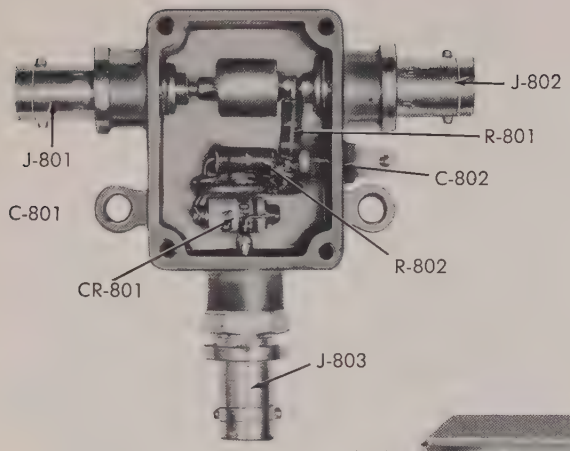


Figure 42
Marker-Mixer
Component

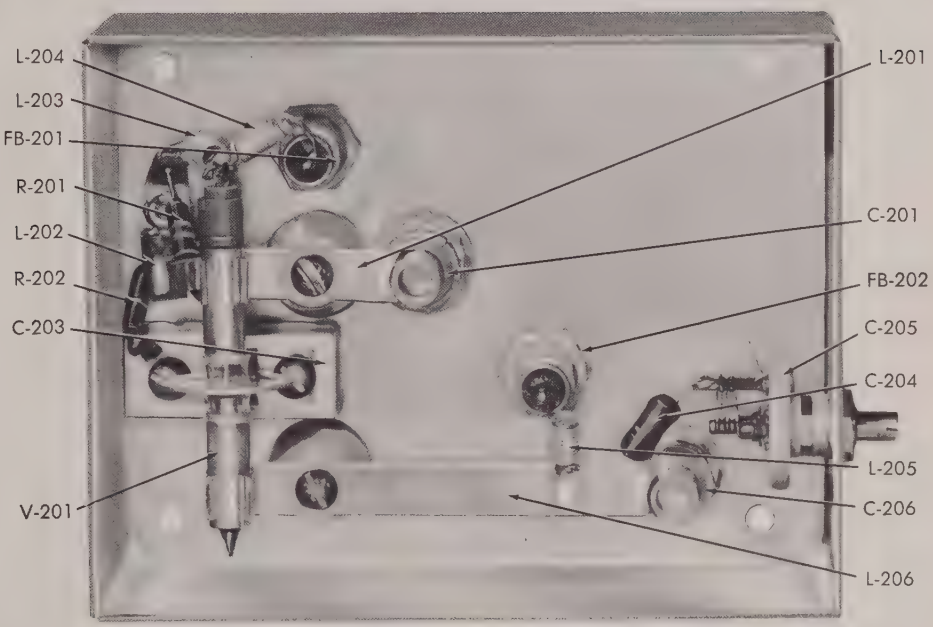


Figure 43
Fixed
Oscillator
Section
(V-201)

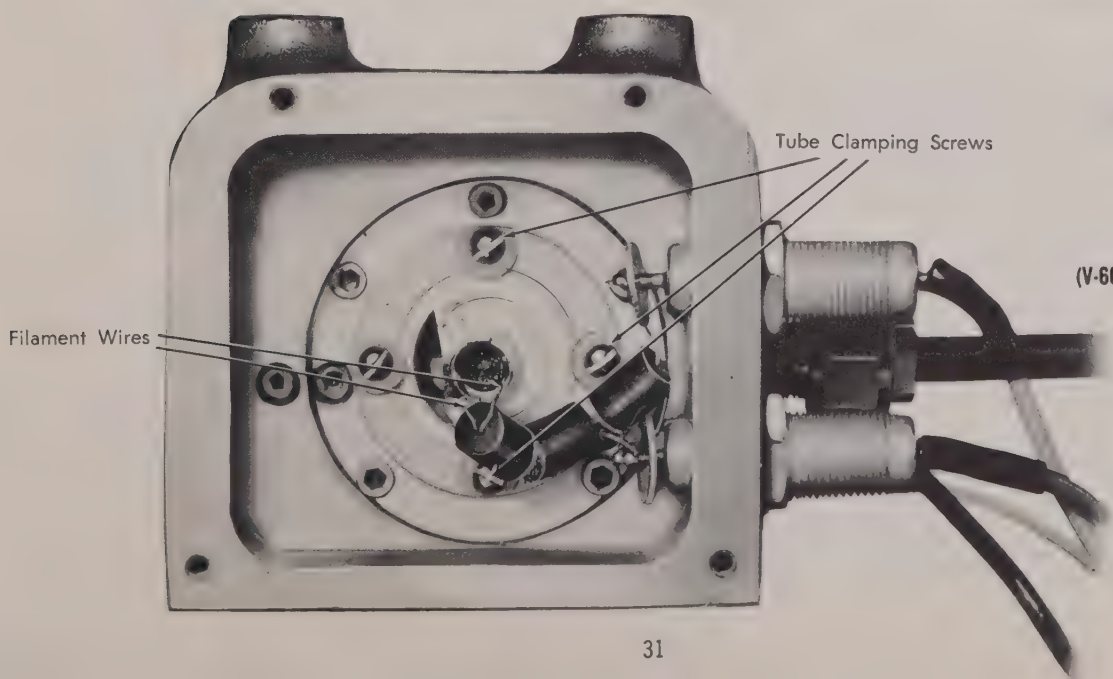


Figure 44
Sweep
Oscillator
Section
(V-601 in Place)

It must be emphasized that the entire operation is critical and any undue strain imposed on the tube at any time will break the tube at the metal-glass seal. As a rule, breakage usually occurs at the seal on the plate side of the grid disc and since this cannot be seen, it is a good idea to listen carefully at all times during assembly for a distant but faint "crack," indicating a broken tube.

11. Resolder wires from bifilar coil to tube. The teflon wire (brown) being soldered to the cathode sleeve and the tan wire soldered to the single filament wire of the tube.
12. At this point an operating check should be made at UHF. The top frequency at max. bandwidth should be about 1250 mc before the oscillator stops. The feed-back tab should be gently pushed toward the center of the cavity (nearer the plate of the tube) and away from the center of the cavity, noting results. The object is to get adequate high frequency oscillation without losing the lower frequency. A rocking motion will be noticed on the pattern and the idea is to balance the response so the low and high ends of the 400 mc sweep width displayed are level.

    After the adjustment, the feed-back tab is left alone, and the cavity cover put back on.
13. If calibration error due to replacement of V-601 is tolerable, the replacement procedure is complete. If greater accuracy is needed refer to paragraphs 6-32 to 6-38 for recalibration of center frequency dial.

6-30 CALIBRATION OF RF OUTPUT METER ON 900-B

Note: A 50-ohm bolometer, HP-430C or equivalent is necessary for this operation.

6-31 Step-by-Step Procedure

1. Calibrating VHF Range
    a. Set sweep generator to VHF range, set sweep width about 1 mc, frequency 50 mc and output attenuator to 0 db.
    b. Blanking switch off (push knob in).
    c. Zero meter with zero control on front panel.
    d. Connect bolometer to RF output.
    e. Set RF output level knob to .2 volt on bolometer.
    f. Note reading on panel output meter.
    g. Adjust meter calibration pot R-304 located on top side of ALC unit until meter reads .2 volt on VHF scale.
2. Calibrating UHF Range
    a. Set sweep generator to UHF range, set sweep width about 1 mc, frequency to 400 mc and output attenuator to 0 db.
    b. Blanking switch off (push knob in).
    c. Zero meter with zero knob.
    d. Set RF output level to indicate 1 volt on panel meter on UHF scale.
    e. Connect bolometer to RF output and read output. It should read 1 volt.
    f. If reading is slightly less than 1 volt, loosen lock-nut on UHF ALC probe where it is screwed into the head. (This is the probe and cable that connect from the sweep cavity to the UHF ALC detector which is located **under** the mixer housing.) Adjust probe **out,**

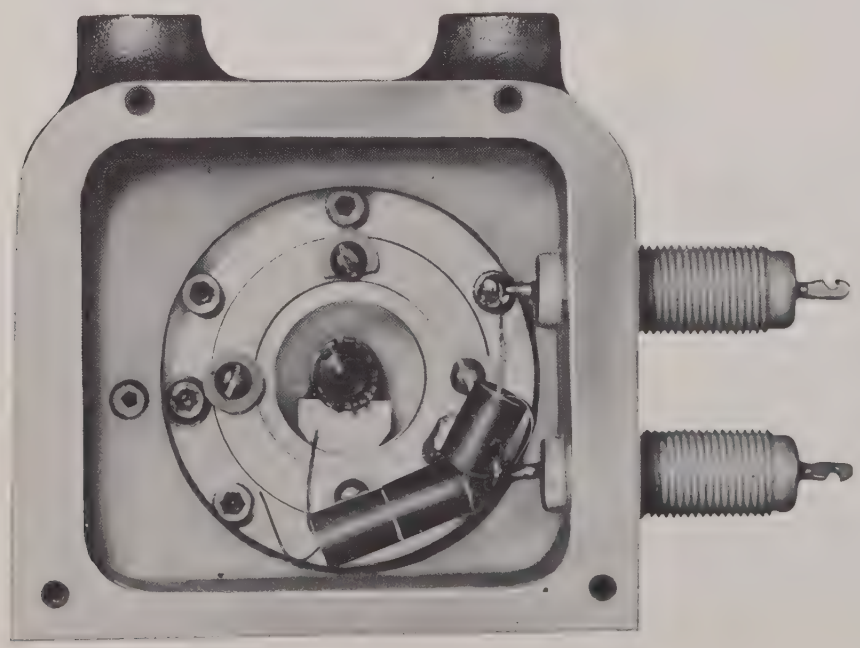


Figure 45—Sweep Oscillator Section (V-601 Removed)

that is, screw slightly out if reading on bolometer is less than 1 volt. If reading at step e is more than 1 volt on the bolometer, the ALC probe must be adjusted **in** slightly. Recheck the process to make sure no errors were made, especially be sure that the blanking switch is pushed in (off) as the meter reading will be halved if the blanking is left on.

6-32 CALIBRATION OF CENTER FREQUENCY DIAL

6-33 General

6-34 The normal use of the 900-B as a sweep generator is in no way affected by the accuracy of the calibration of the center frequency dial. However, when first received by the customer, the center frequency dial has been accurately calibrated by thoroughly-experienced technicians equipped with the necessary special tools.

After long use, the diaphragm of the wobbulator may soften and relax, which may cause a noticeable discrepancy in the accuracy of the dial calibration especially in the wide sweep position on both the UHF and VHF scales. Other factors which affect calibration are the replacement of sweep oscillator tube V-601, the adjustment of the feedback tab on this tube, or the adjustment of any of the three probes. Any slight error in calibration caused by these factors may usually be compensated for by adjustment of the cursor located below the dial.

In cases where a combination of factors has caused a degree of error in calibration which is not tolerable to the user, it is recommended that the unit be returned to the factory for recalibration since the process is involved and requires special skills and equipment. If this course of action is not feasible and skilled technicians with the proper tools are available, the method of recalibration is given in paragraphs 6-35 to 6-38.

6-35 Determine Extent of Calibration Necessary

1. Connect 900-B to an oscilloscope.
2. Check the calibration of the instrument at NARROW operation of both UHF and VHF, using the internal markers of the 900-B.

   If these scales are still in reasonable calibration, it will only be necessary to recalibrate the wide band per paragraph 6-38, step 15 b.

6-36 Equipment Required for Calibration

1. Tools: a rack-setting gauge; capstan wrench, special long-handle Allen wrench for coupling screws; special long-handle Allen wrench for head-mounting; jig to mount head while calibrating; and special tool to remove wide-narrow switch shaft.

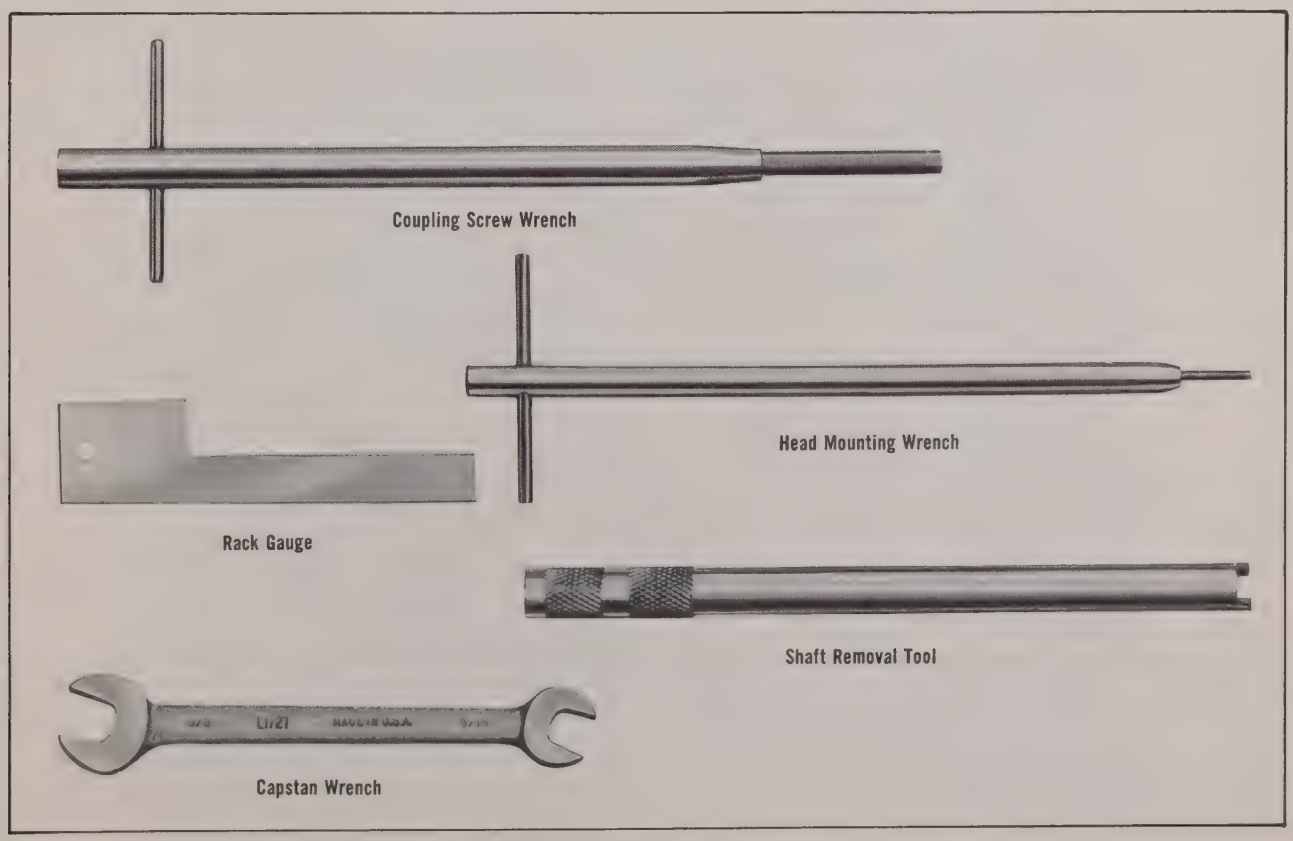


Figure 46—Tools Required for Calibration

2. Patch Cords: Power cable extension; RF probe extension (RG-55 A/U); ALC probe extension (RG-55 A/U); and harmonic marker probe extension (RG-55 A/U).
3. Instruments: A bolometer (RF power meter capable of measuring levels of .2 volt and 1 volt at 50 ohms).

6-37 **Preparing Instrument for Calibration**

1. Remove 900-B chassis from rack or cabinet.
2. Remove plug P-15 from socket S-4.
3. Remove plug P-1 from socket S-12.
4. Disconnect all RF cables from the sweep head at the connectors.

   CAUTION: DO NOT REMOVE PROBE ASSEMBLIES SCREWED INTO HEAD CASTINGS.
5. Disconnect all cables which interfere with removing head assembly.
6. Remove FINE-TUNING knob from front panel.
7. Remove WIDE-NARROW switch knob from front panel.
8. Slide special tool over shaft of WIDE-NARROW switch until key in tool engages the shaft locking nut. Unscrew nut ccw until shaft is free and remove shaft. (See Fig. 47.)
9. Stand 900-B chassis on end (transformer down).
10. Remove two Allen-head capscrews that fasten head to rubber mountings with special long-handle Allen wrench. Access to screws is from the bottom of the chassis near the 115-230 VOLT switches.
11. Return chassis to original position on bench.
12. Support sweephead with hand while removing two Allen-head capscrews at the top of the sweephead casting.
13. Gently maneuver head out of chassis, tilting the left end up and to the left and being careful that the head does not catch or bind on any cables. DO NOT USE FORCE. (See Fig. 51.)
14. Remove wobbulator motor shield and housing.

    CAUTION: AFTER SHIELD HOUSING IS REMOVED, DO NOT REST HEAD ON WOBBULATOR MOTOR.
15. Install sweephead in the alignment jig and securely tighten the mounting screws. (See Fig. 52.)
16. Connect power supply and probe cables to sweephead via patch cords.

    Note 1: It is not necessary to extend cable from P-1 (dial indicators) for operation unless the operator particularly desires that the indicating arrows function.
    Note 2: Use of extension cables will cause a deterioration in the flatness of the response curve due to mis-match. This will not affect calibration.
17. Re-connect coaxial cables previously removed in step 5.
18. Replace NARROW-WIDE switch shaft and replace knob on shaft.
19. Replace FINE TUNING knob on shaft.

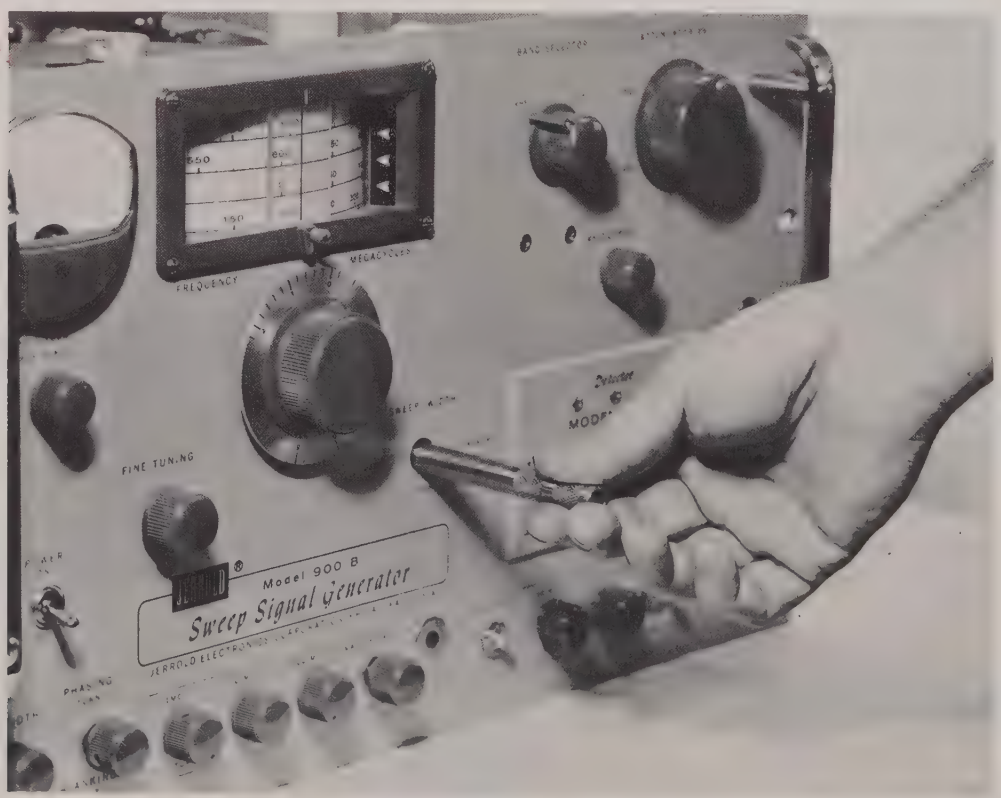


Figure 47—Removing Switch Shaft

6-38 CALIBRATION PROCEDURE

1. Initial Set-Up
   a. Connect 900-B to oscilloscope.
   b. Connect RF OUTPUT to one fitting on the D-50 detector and terminate other fitting with terminating resistor.
   c. Set UHF-VHF switch to UHF position.
   d. Set NARROW-WIDE switch to WIDE position.
   e. Set SWEEPWIDTH control to maximum cw or to just before wobbulator clatters.
   f. Set CENTER FREQUENCY control to display to highest frequencies, i.e. 800 to 1200 mc.
   g. Turn 100 mc markers ON.
2. Set Feed-Back Tab
   a. Remove end cover from sweep oscillator housing to expose feed-back tab which is soldered to the cathode sleeve of V-601 and sticks out thru the grid flange.
   b. Gently push the tab closer to the tube with a small-diameter bakelite rod. The amplitude of the response should increase. The proper setting is when the oscillator is oscillating at as high an amplitude as possible. Do not adjust for more feedback than needed.
   c. Change CENTER FREQUENCY control setting to display the lowest wide UHF frequency (275 mc) and observe the response at that frequency. If the oscillator stops oscillating or the amplitude drops off too much, more feedback will be required. However, the final setting will be a compromise position which favors the high frequency setting as much as possible and yet insures that the output voltage specification of at least 0.5 volts for the entire frequency range is met when ALC is applied.
3. Set RF Output Probe (Probe that connects to coaxial switch).
   a. Set CENTER FREQUENCY control to display high end of range.
   b. Loosen locknut on the probe and turn probe in until the high frequencies drop off. Screw probe out just enough to be sure the highest frequencies are not affected and then tighten locknut.
4. Set ALC Probe (Probe toward rear of chassis when head is mounted).
   a. See par. 6-31 f for the proper setting of this probe.
5. Set Harmonic Marker Probe (Probe nearest front panel).
   a. This probe setting is not critical. The normal position is secured in two or three turns. Check to see that it has not been screwed in farther, since the additional capacity thus placed on V-601 would be harmful to tracking.
6. Turn WIDE-NARROW switch to NARROW position.
7. Twist rack dust cover tube ccw to disengage bayonet-type lock and ease it off rack. (See Fig. 53.)
8. Set the position of rack with rack-setting gauge as shown in Fig. 54.
9. Set cursor below dial to center of its range of travel
10. If dial now reads 600 mc, proceed to step 11. If not—
    a. Loosen set screws on dial gear. (See Fig. 55.)
    b. Rotate dial by hand until 600 mc lines up with the indicator line.
    c. Re-tighten set screws and re-check rack position with rack gauge to be sure it did not shift. Re-check dial position.
11. Tune dial until 600 mc marker appears at center of screen.
12. Adjust sweepwidth until birdy is fully shown on screen.
13. Note dial reading.
    a. If dial reading is 600 mc, proceed to step 14.
    b. If dial reading is less than 600 mc:
       (1) Slightly screw RF probe **IN.** This should be done cautiously as this probe has already been set and the basic setting must not be lost. Adjust in increments of ¼ turn, not to exceed one full turn.
       (2) Adjust ALC probe and meter calibration.
       Note: Sometimes it is necessary to go back and forth to secure proper dial and meter calbiration.
    c. If dial reading is more than 600 mc:
       (1) Same procedure as in step b (1) except that the RF probe is screwed **OUT.**
       (2) Same procedure as in step b (2).
14. Check dial tracking.
    a. Tune the dial to 700 mc and check the calibration. Repeat the process at 800, 900, 1000, 1100, and 1200 mc. If there are only slight deviations (i.e. 1 division at 1200 mc), the process is complete for the narrow band. Proceed to step 15.
    b. If deviations have been noted, the tracking between 600 and 1200 mc has been either expanded or compressed. There are two factors, one electrical and the other mechanical, which can be adjusted to correct the deviation. Try to correct electrically first by adjusting RF probe in or out according to the direction of deviation as in step 13 b and c. If the result is satisfactory, proceed to step 15. If not, loosen set screws as in step 10 a and very

slightly slide dial one division either above or below 600 mc, depending on the direction of the deviation. Retighten set screws and then readjust the RF probe to make dial read properly on 600 mc. Re-check dial tracking as per step 14 a.

Note 1: Sometimes the dial will track perfectly but will be off calibration by a slight amount at all frequencies. A limited adjustment may be made by loosening the knurled nut on top of the dial drum to release tension on the dial card. The card may be then slid in the appropriate direction on the drum. The key way on the drum limits the amount of possible adjustment.

Note 2: A defective or weak oscillator tube will make it impossible to get the dial to calibrate or track properly. An indication is higher than normal plate current on V-601 and fall-off of the higher frequencies around 1200 mc.

15. Calibrate wide-band scales.

    a. If these scales are within tolerance, the calibration procedure is complete.

    b. If these scales are not within tolerance, the wobbulator motor must be repositioned to increase or decrease the capacitance as determined by the direction of deviation. Normally the deviation will be due to the softening of the wobbulator suspension and the dial will read below 600 mc. In this case the wobbulator motor will have to be moved closer to the fixed capacitor plates in the oscillator cavity. The wobbulator motor is mounted on three supports which are adjustable by means of a screw threaded into the base plate. These screw mounts are called capstans and are adjusted by an open-end wrench after the locking nuts have been loosened by a special Allen wrench.

    c. Procedure:

        (1) Loosen **one** locking screw at a time.

        (2) Turn capstan (clockwise for more capacity) one flat and tighten locking screw. Repeat process on other two capstans.

        (3) Pivot capstan (Fig. 56) acts as the pivot adjustment and is used to center the wobbulator plates. To center wobbulator, adjust this capstan.

            (a) Adjust sweepwidth control for a 10 mc sweep.

            (b) Slightly loosen locking screw and adjust pivot capstan up or down while watching birdy on screen. Turn in the direction that causes birdy to move left (keep following the capstan nut adjustment with the locking screw to be sure the wobbulator motor is following the capstan) till the birdy is as far to the left of the screen as it will go. If you turn past this point, the birdy will move right. At the extreme left position the wobbulator is centered.

        (4) Check calibration. If within tolerance, calibration is complete. If not, repeat c (1), (2), (3) and (4) until calibration is within tolerance.

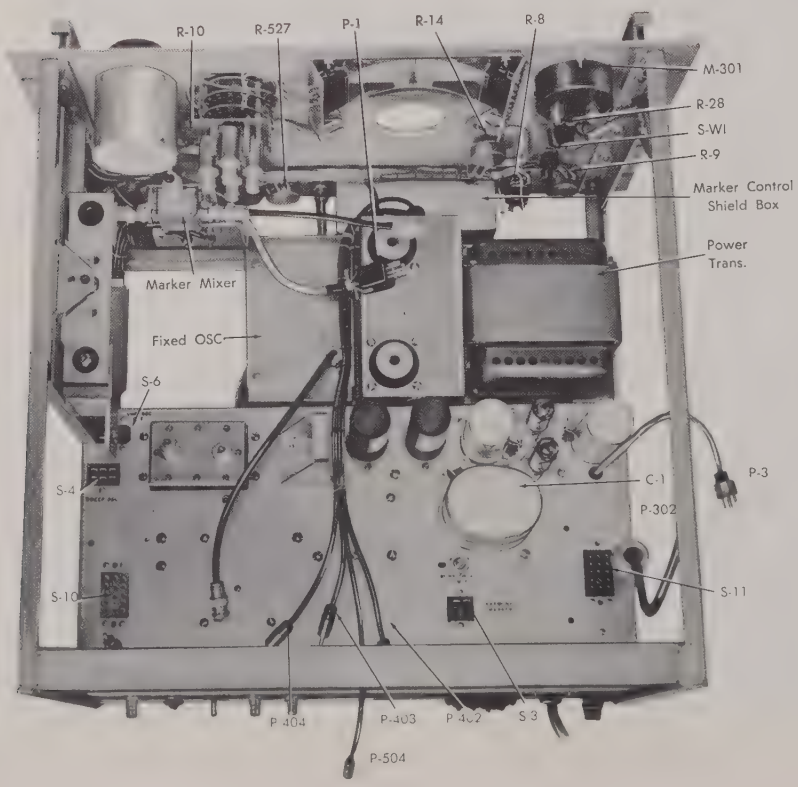


Figure 48—Top View of 900-B (Unitized Components Removed)

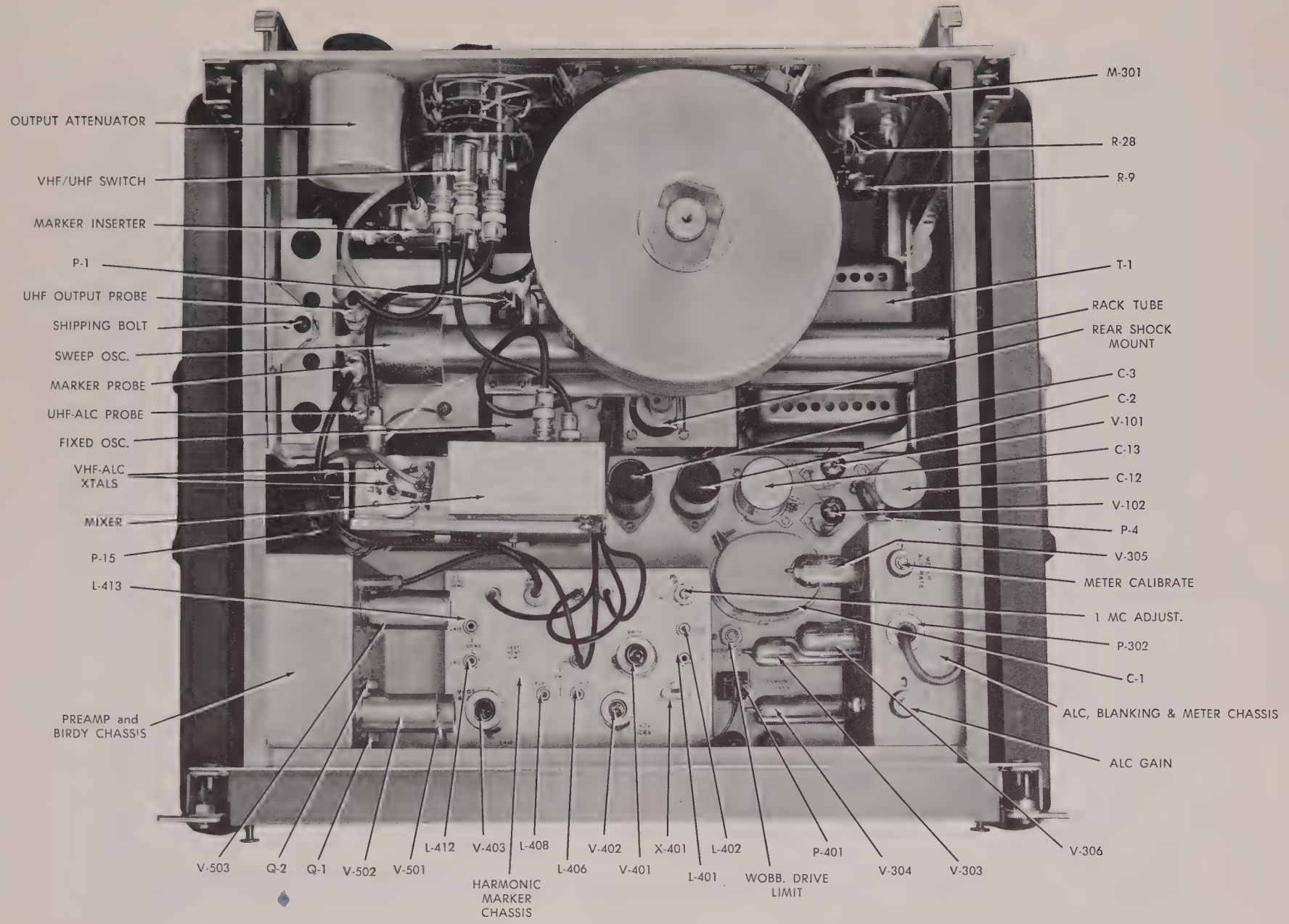


Figure 49—Top View of 900-B (Unitized Components in Place)

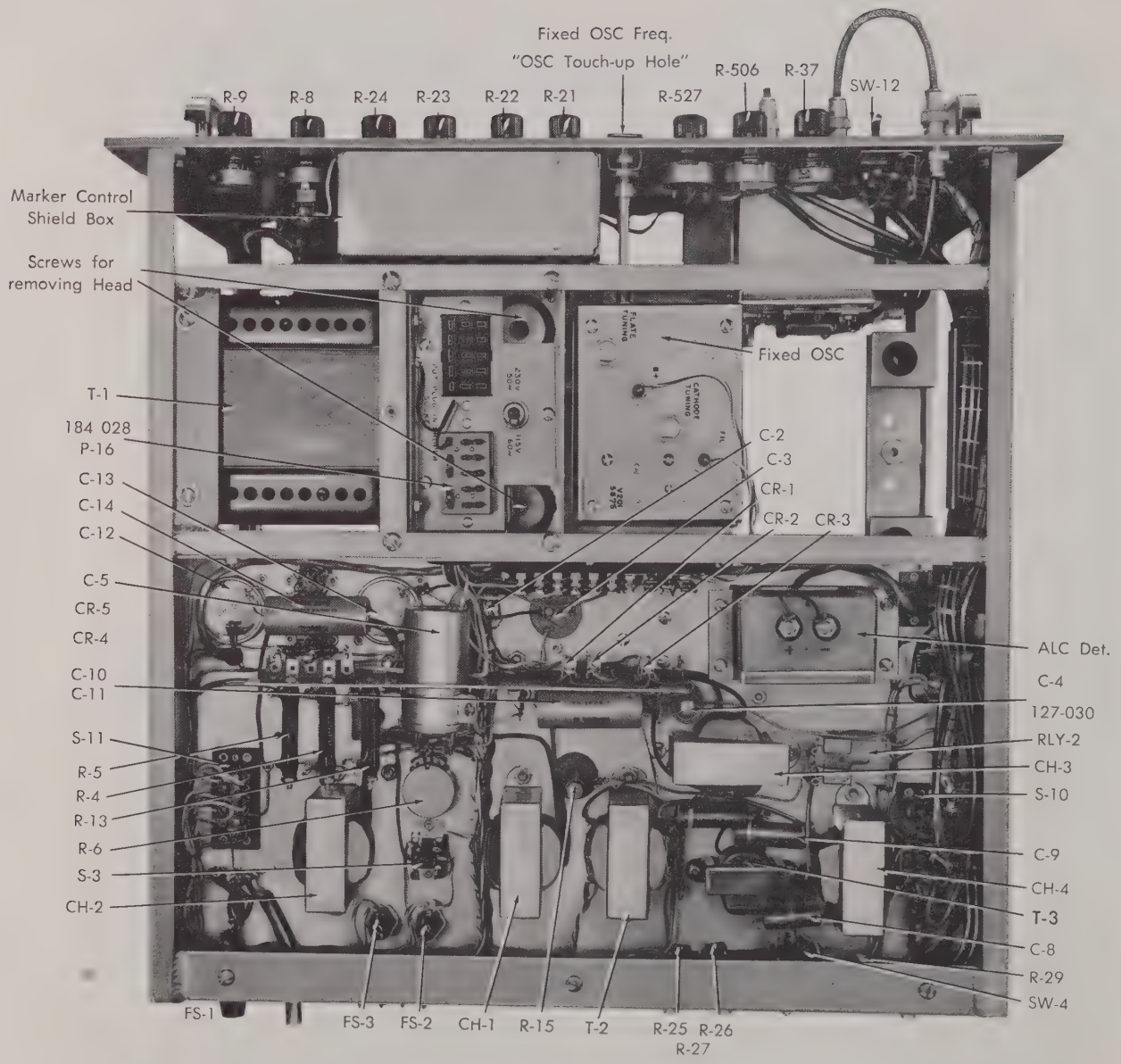


Figure 50—Bottom View of 900-B

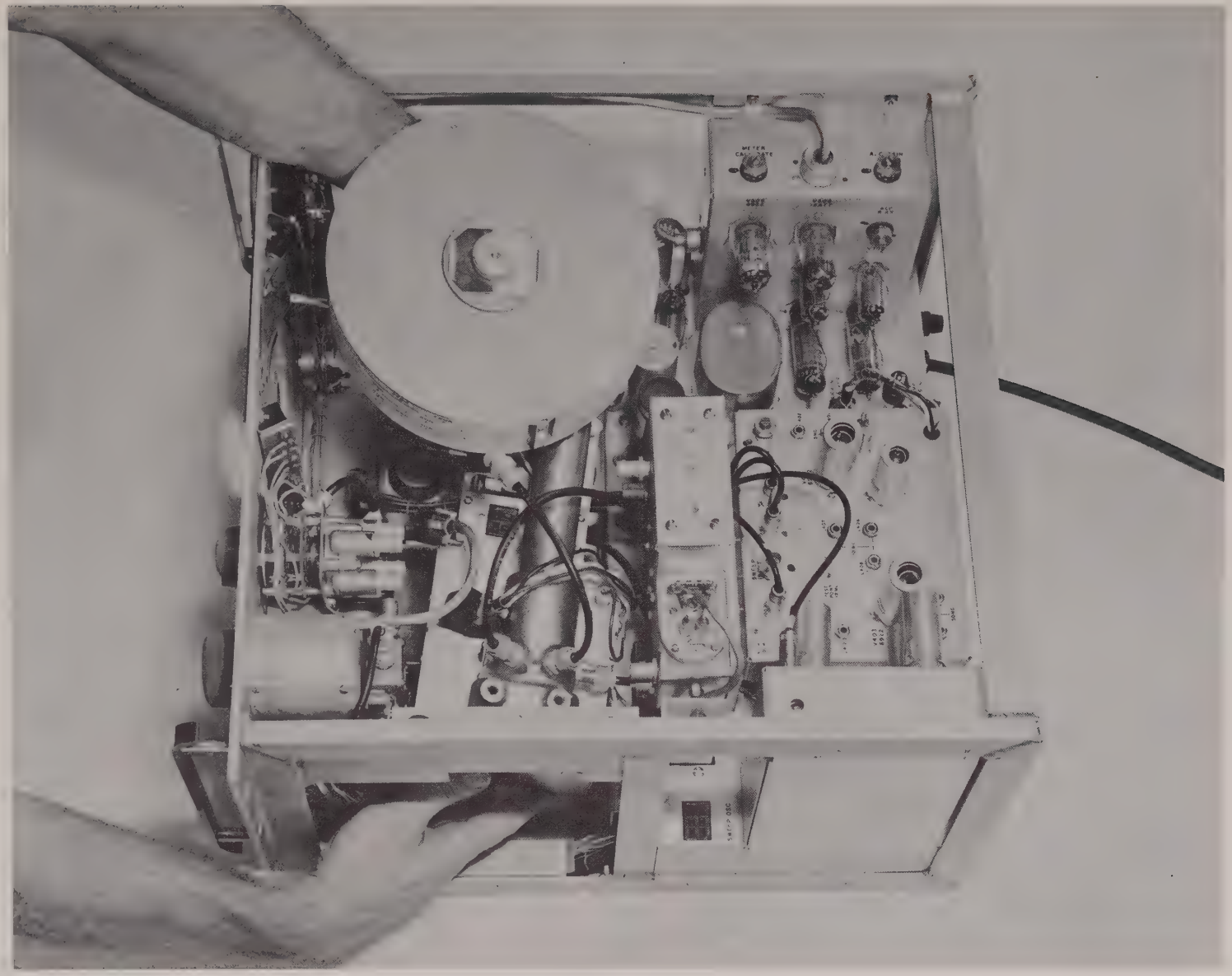


Figure 51—Removing Head from Chassis

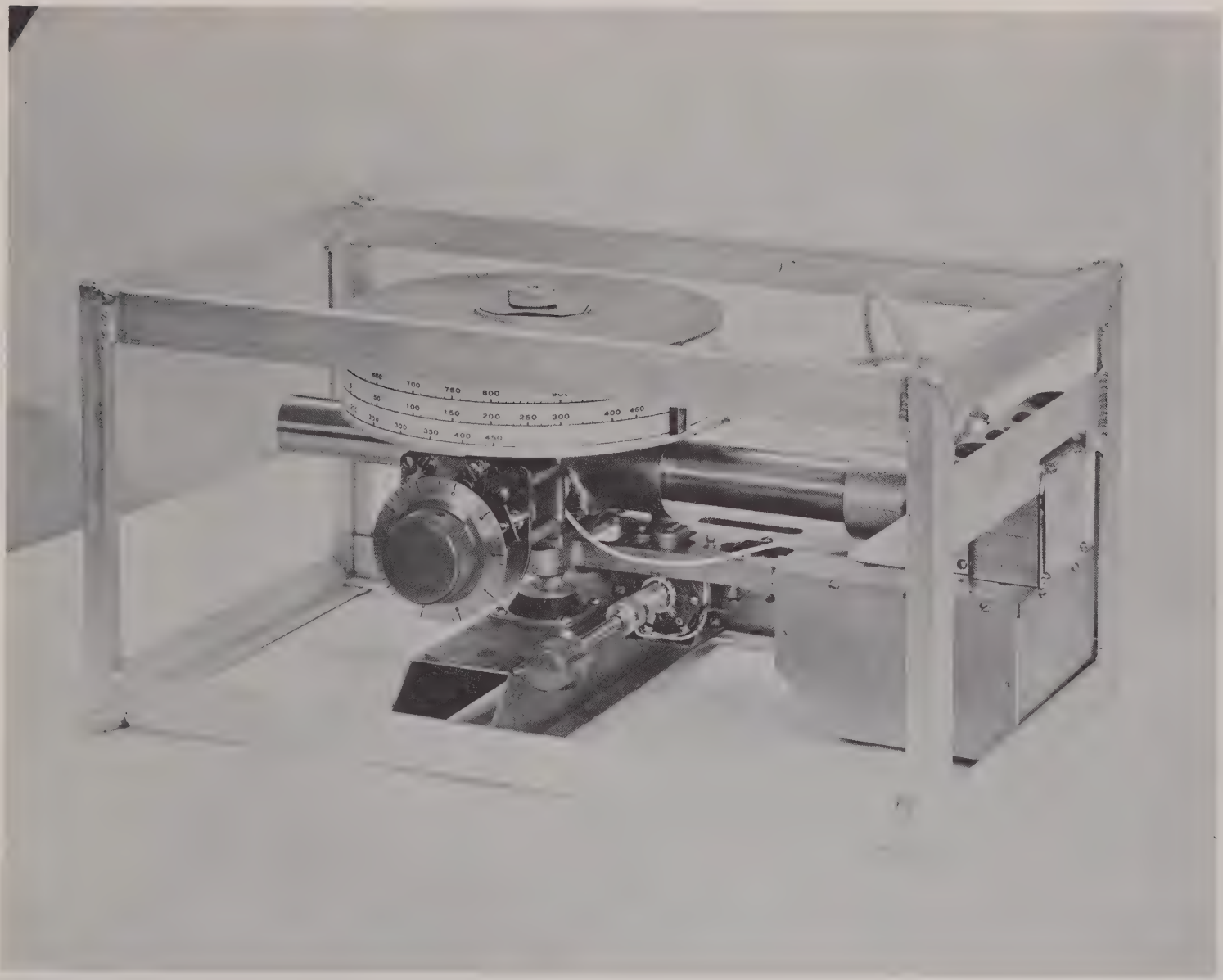


Figure 52—Sweep Head Installed in Alignment Jig

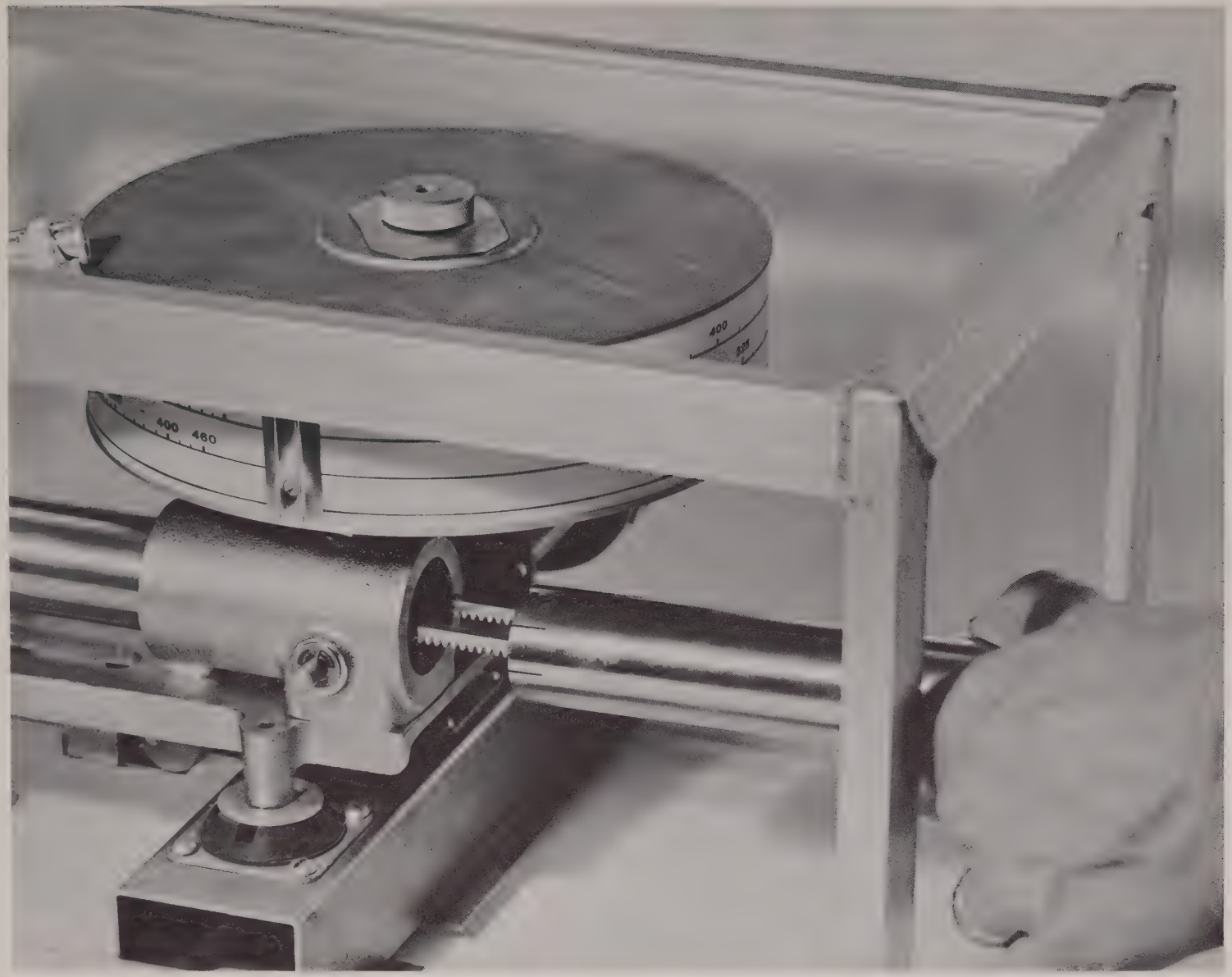


Figure 53—Removing Rack Cover

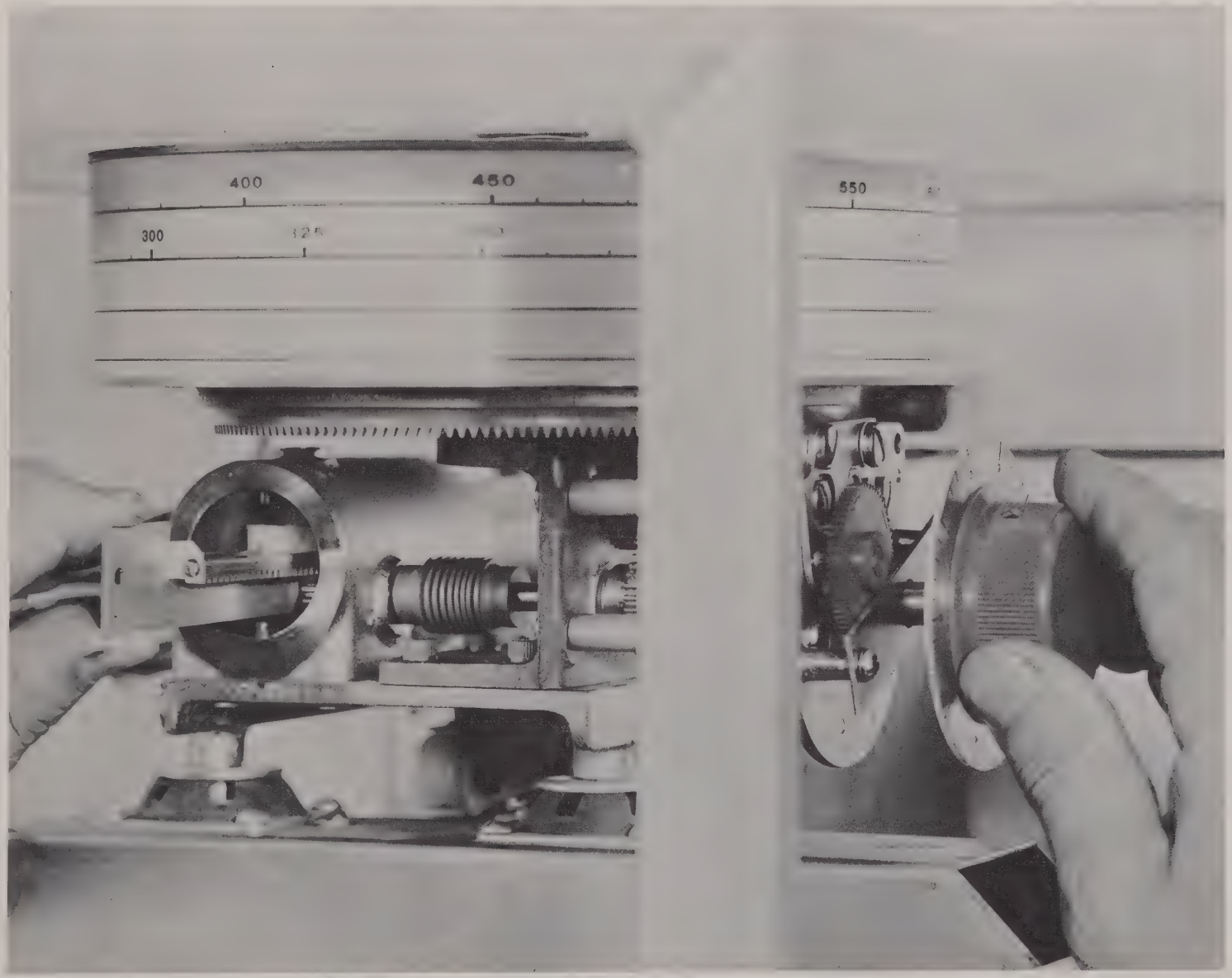


Figure 54—Setting Position of Rack with Rack Gauge

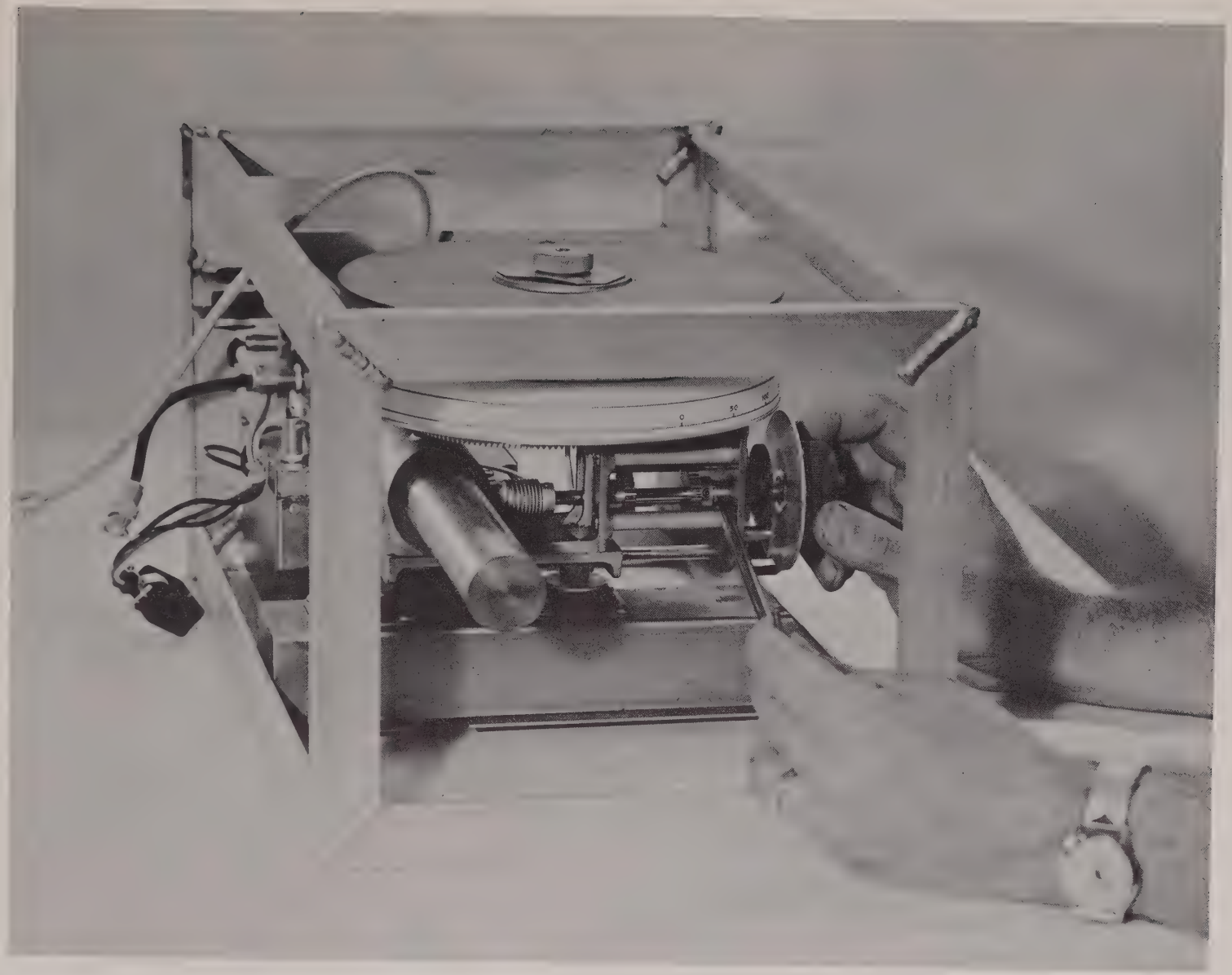


Figure 55—Loosening Set Screw to Adjust Dial

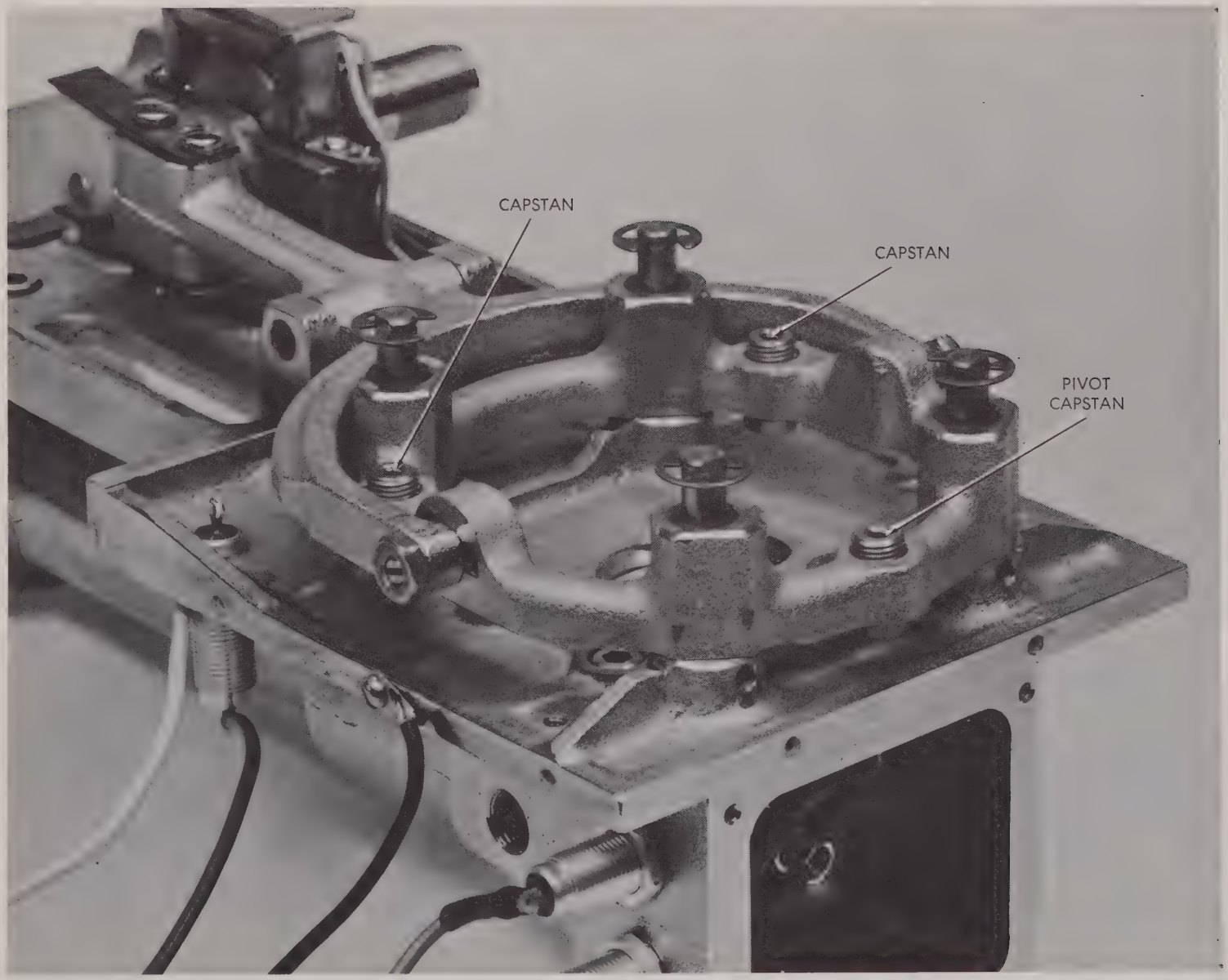


Figure 56—Wobbulator Mounting Ring

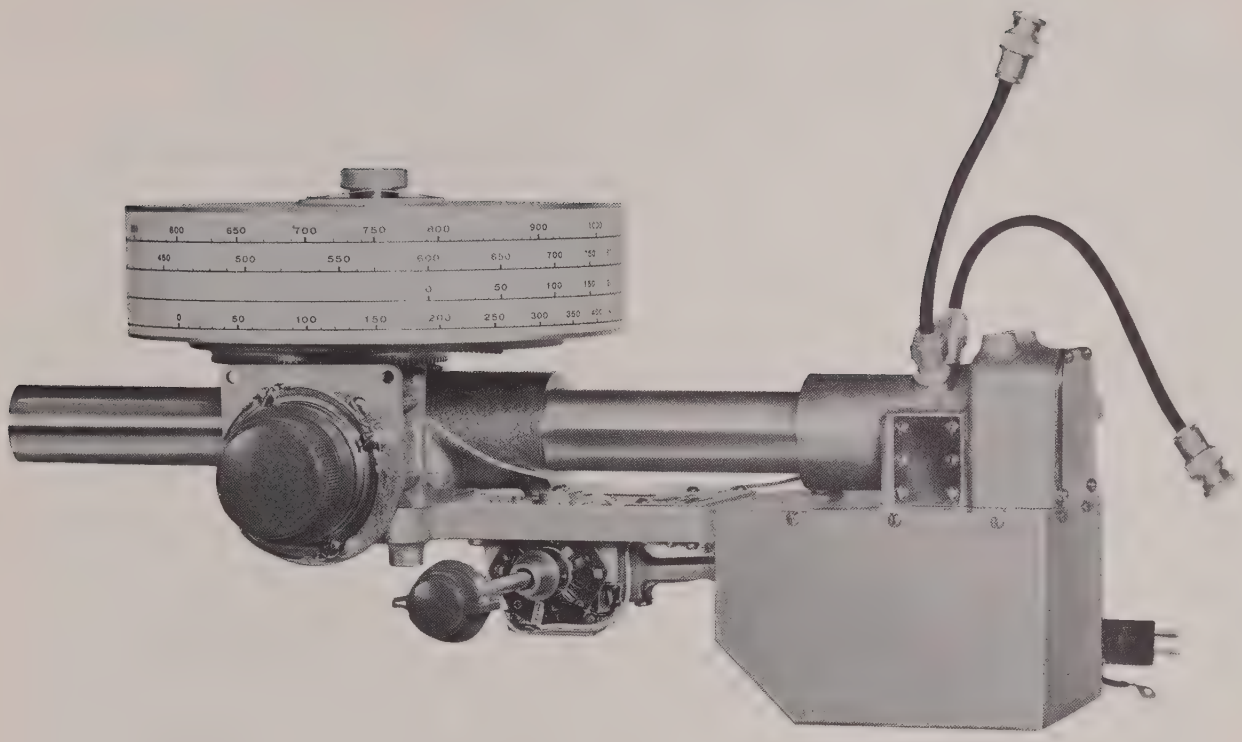


Figure 57—Sweep Oscillator Head

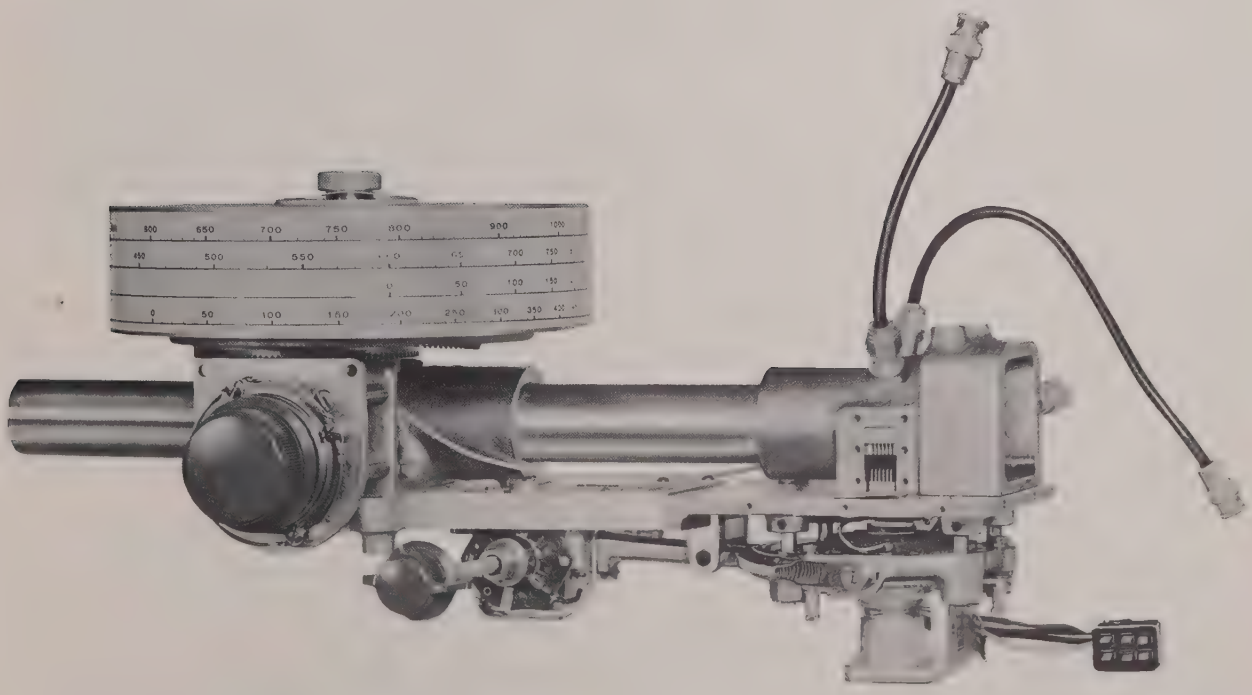


Figure 58—Sweep Oscillator Head (Cover Removed)

TABLE IV—TROUBLE SHOOTING CHART

SYMPTOM: No UHF or VHF output voltage.

Check:	Remedy:
a. Fuses FS-2 and 3.	a. If blown, determine the reason, repair or replace faulty component and replace fuse.
b. Rectifiers CR-1, 2, 3, 4 and 5.	b. Replace bad rectifier observing proper polarity according to POWER SUPPLY schematic.
c. Power supply voltages.	c. If proper voltages per POWER SUPPLY schematic are not present, determine reason and repair or replace faulty component.
d. 6-prong Jones receptacle S-4 for proper voltages to sweep oscillator.	d. Isolate trouble and repair or replace faulty component.
e. V-601.	e. Replace defective tube per paragraphs 6-28 to 6-29.
f. UHF probe assembly by removing connector RED cable from coaxial switch, and measuring resistance of probe assembly from connector end with ohmmeter. Should measure 50 to 75 ohms.	f. Replace defective probe.
g. Coaxial switch by bypassing switch with a coupling barrel.	g. Replace defective switch.
h. D-50 detector crystals CR-901 and 902 for proper polarity per PREAMP & BIRDY AMP schematic and for forward and reverse resistance with an ohmmeter. Forward should be 100 to 200 ohms and reverse should be 50 k ohms to 200 k ohms.	h. Replace faulty crystals per paragraphs 6-13 to 6-17.
i. Tubes V-301, 302, 303 and 304.	i. Replace defective tube.
j. Voltages on V-301, 302, 303 and 304 per TABLE VI.	j. If not within parameters, determine reason and repair or replace defective component.
k. Filter barrels FB-601, 602 and 603 for shorts or opens.	k. Replace defective filter barrel.

SYMPTOM: UHF output but no VHF output.

Check:	Remedy:
a. V-201 for proper voltages per TABLE VI.	a. If not within parameters, determine reason and repair or replace defective component.
b. V-201.	b. If tube is defective, replace per paragraphs 6-24 to 6-25.
c. Cable connections to and from mixer.	c. Replace faulty connectors.
d. Coaxial switch by bypassing switch with coupler barrel.	d. Replace defective switch.
e. B+ current on V-201 by inserting a milliameter between the plate and L-206. Should read less than 20 ma.	e. If reading is 20 ma or more, replace V-201 per paragraphs 6-24 to 6-25.
f. Mixer crystals CR-701 and 702 for proper polarity per RF CIRCUIT schematic and check forward and reverse resistance with ohmmeter. Should measure 100 to 200 ohms forward and 50 k to 200 k ohms reverse.	f. Replace faulty crystals per paragraphs 6-18 to 6-19.

SYMPTOM: No ALC action on either UHF or VHF output.

Check:	Remedy:
a. Tubes V-301, 302, 303 and 304.	a. Replace defective tube.
b. Voltages on V-301, 302, 303 and 304 per TABLE VI.	b. If not within parameters, determine reason and repair or replace defective component.

SYMPTOM: No ALC circuit on UHF.

Check:	Remedy:
a. Relay contacts on RLY-3.	a. Clean contacts.
b. Crystal diodes CR-101 and 102 for proper polarity per RF CIRCUIT schematic and check forward and reverse resistance with ohmmeter. Should measure 100 to 200 ohms forward and 50 k to 200 k ohms reverse.	b. Replace faulty crystals per paragraphs 6-13 to 6-17.

SYMPTOM: No ALC circuit on VHF.

Check:	Remedy:
a. Relay contacts on RLY-3.	a. Clean contacts.
b. Coil of relay RLY-3 for condition and for the necessary 5 v dc operating voltage. **Note:** If relay RLY-3 does not operate, V-201 will not receive B+ and there will be no VHF.	b. Repair or replace defective component.

SYMPTOM: ALC functions but does not flatten response to specifications on VHF.

Check:	Remedy:
a. To isolate trouble.	
(1) Connect a 50-ohm patch cord between the RF output and D-50 detector input with detector terminated properly. If response flattens, the trouble is in the external test set-up. If not, proceed.	a. (1) Find and repair trouble in external test set-up.
(2) Open cabinet and connect mixer VHF output jack J-702 directly to the D-50 detector. If response flattens, trouble may be in either coaxial switch or marker inserter. By-pass each in turn to determine if either is faulty. If response does not flatten, proceed.	(2) Repair or replace faulty component.
(3) Crystals CR-703 and 704 for proper polarity per RF CIRCUIT schematic and measure forward and reverse resistance with ohmmeter. Forward should be 100 to 200 ohms and reverse 50 k to 200 k ohms.	(3) Replace faulty crystals per paragraphs 6-20 to 6-21.

SYMPTOM: Response is generally flat, but rises sharply at zero beat on VHF range.

Check:	Remedy:
a. Crystals CR-703 and 704 for proper polarity per RF CIRCUIT schematic and measure forward and reverse resistance with ohmmeter. Forward should be 100 to 200 ohms and reverse 50 k to 200 k ohms.	a. Replace faulty crystals per paragraphs 6-20 to 6-21.

SYMPTOM: Insufficient sweep width.

Check:	Remedy:
a. Warm-up time.	a. Allow unit to warm up at least 30 minutes.
b. Setting of SWEEPWIDTH control.	b. Re-set for proper sweep width.
c. Wobbulator motor.	c. If defective, return unit to factory.

SYMPTOM: Insufficient RF output voltage on both UHF and VHF.

Check:	Remedy:
a. 6-prong Jones receptacle S-4 for proper voltages to sweep oscillator.	a. Isolate trouble and repair or replace faulty component.
b. V-601.	b. Replace defective per paragraphs 6-28 to 6-29.
c. Coupling of pick-up probe on RED cable.	c. This probe has been carefully adjusted at the factory and the setting should **not** be disturbed unless it is impossible to ship the instrument to the factory. The emergency procedure follows: (1) Set 900-B for UHF-WIDE operation at maximum sweep width and at highest frequency. Turn RF OUTPUT control fully clockwise. (2) Disconnect the RED probe cable from the coaxial switch. (3) Back off locknut and screw probe in one turn at a time checking the response each time by connecting it back to the coaxial switch. As the probe is screwed in, the pattern should increase in amplitude until the high-frequency end of the response starts to drop. Now back the probe out till the response no longer drops. Tighten locknut. (4) Set SWEEPWIDTH control to NARROW and turn on 100 mc marker. Tune frequency dial to 600 mc and see if marker agrees with the dial at this point. If not, loosen lock nut and move probe **slightly** either in or out until the marker agrees with the dial setting. Then tighten lock nut. (5) Recalibrate the meter circuit as per paragraphs 6-30 to 6-31. (6) If detector D-50 is being used, check CR-901 and 902 as per SYMPTOM: No UHF or VHF output voltage (h) in this chart.

SYMPTOM: SWEEPWIDTH control acts rubbery at maximum sweep width position.

Check:	Remedy:
a. To see if the condition (due to a change in compliance of the wobbulator motor suspension) is really disturbing to the operator.	a. If intolerable, return unit to factory for wobbulator drive replacement.

SYMPTOM: Response breaks up erratically and changes with setting of SWEEPWIDTH control.

Check:	Remedy:
a. Capacitor plates of wobbulator for rubbing or dirt in plates.	a. Sometimes a sharp tap with a light hammer on the sweep housing will dislodge dirt and clear up trouble. If not, return unit to factory for wobbulator adjustment or replacement.

SYMPTOM: No sweep as SWEEPWIDTH control is varied.

Check:	Remedy:
a. Wobbulator motor voice coil for open circuit.	a. Replace wobbulator motor.
b. Wobbulator drive circuit and voltage per RF CIRCUIT schematic.	b. Locate trouble and repair or replace defective component.
c. Transformer T-1 for open winding.)	c. Replace or repair defective transformer.

SYMPTOM: Changing center frequency by main tuning knob, causes response to be erratic and jumpy at certain frequencies, especially the higher UHF.

Check:	Remedy:
a. For intermittent contact on inner slider due to dirt or wear.	a. Return unit to factory for disassembly, cleaning, relubrication, and reassembly.

SYMPTOM: No blanking.

Check:	Remedy:
a. V-306.	a. Replace defective tube.
b. Blanking switch SW-10.	b. Replace defective switch.
c. Voltage in blanking circuit per ALC, BLANKING, and METER AMP schematic.	c. Locate trouble and repair or replace defective component.

SYMPTOM: Cannot balance preamplifier with BAL control.

Check:	Remedy:
a. V-501 for balance.	a. If off, select another tube.
b. Transistors Q-1 and 2 for balance.	b. If off, select other transistors.

SYMPTOM: Trace jitters when tapping instrument even at wide sweep widths.

Check:	Remedy:
a. V-501 for microphones.	a. Replace tube.

SYMPTOM: Birdy markers do not change to narrow when in narrow sweep position.

Check:	Remedy:
a. Relay RLY-1 contacts.	a. Clean contacts.
b. Relay RLY-1 for 5 v dc operating voltage.	b. Locate trouble and repair or replace defective component.
c. Relay RLY-1 coil for continuity.	c. Repair or replace relay.

SYMPTOM: No markers appear on pattern.

Check:	Remedy:
a. Setting on oscilloscope. Should be 0.1 v per cm.	a. Change setting if incorrect.
b. To see that detected signal goes through preamplifier.	b. Locate trouble and repair or replace defective component.
c. Voltages to marker generator.	c. Locate trouble and repair or replace defective component.
d. Probe connection to marker generator.	d. Make connection.
e. Test points on markers for proper voltage with VTVM. Should be 15 volts at 10 mc test point and 1 volt at 100 mc test point.	e. Locate trouble and repair or replace defective component.
f. 5 mc crystal X-401.	f. Replace defective crystal.
g. V-401.	g. Replace defective tube.

TABLE V—RESISTANCE MEASUREMENTS

(IN OHMS)

	POWER SUPPLY		VHF OSC	ALC				METER AMP	BLANK-ING	HARMONIC MARKER				PREAMPLIFIER				UHF OSC
TUBE PIN	V-1	V-2	V-201	V-301	V-302	V-303	V-304	V-305	V-306	V-401AB	V-402	V-403AB	V-501	Q-1	Q-2	V-502	V-503	V-601
	0A2	0A2	5675	6AU6	6AU6	6CW5	6CW5	6922	12AT7	6922	6CB6	6922	6922	2N1224	2N1224	6AU6	12AY7	5675
1	18 k	0		45 k	45 k	1 m	1 m	150 k	500 k	75 k	2		180 k	4.5 k	4.5 k	450 k	19 k	NO RESISTANCE READINGS
2	0	15 k		200 k	200 k	1.4 m	1 m	450	42 k	10 k	0		340 k	6.9 k	6.9 k	0	120	
3	0	0		10	10	70 k	70 k	280 k	Inf.	0	0		0	3 k	3 k	0	1 k	
4	0	15		10	10	10	10	100	100	0	0		1			1	1	
5	19 k	0		500 k	500 k	10	10	100	100	0	240 k		180 k			190 k	1	
6				150 k	150 k	Inf.	Inf.	150 k	500 k	280 k	120 k		180 k			190 k	7.5 k	
7		15		200 k	200 k	Inf.	4 k	400	3 m	12 k	0		300 k			130 k	10 k	
8						Inf.	4 k	250 k	Inf.	0			0				1 k	
9						10 k	10 k	Inf.	0	0								

Reading—Pin to chassis. Equipment—off. Tolerance—±10%.

TABLE VI—VOLTAGE MEASUREMENTS

	POWER SUPPLY		VHF OSC	ALC				METER AMP	BLANK-ING	HARMONIC MARKER				PREAMPLIFIER				UHF OSC
TUBE PIN	V-1	V-2	V-201	V-301	V-302	V-303	V-304	V-305	V-306	V-401AB	V-402	V-403AB	V-501	Q-1	Q-2	V-502	V-503	V-601
	0A2	0A2	5675	6AU6	6AU6	6CW5	6CW5	6922	12AT7	6922	6CB6	6922	6922	2N1224	2N1224	6AU6	12AY7	5675
1	+150		NO VOLTAGE READING	+1	+1				+95	+30	—8	+30	+25	25	25	—2.5	+145	
2		—144		+4	+4	—150	—150		—4	—7	6.3 ac	—1.5		25	25		0	
3				6.3 ac	6.3 ac	—150	—150	+2.5	0	0	0	0	+1	—1.5	—2.5		+1.7	—70
4				6.3 ac	6.3 ac	6.3 ac	6.3 ac	6.3 ac	6.3 ac	0	+280	0	+5			+5	+5	
5	+150			+60	+60	6.3 ac	6.3 ac	6.3 ac	6.3 ac	6.3 ac	+145	6.3 ac	+5			+150	+5	
6				+100	+100			+75	+25	+110	0	+28	+25			+150	+148	
7		—140		+4	+4	—80	—120		—180	—12		—6				0		
8								+2.5	—150				+1				+1.7	
9						—50	—50	6.3 ac	6.3 ac									

Tolerance—±10%.

Harmonic Marker

1. All voltages measured with VTVM reference to ground.
2. Negative voltages are bias voltages due to presence of signal. Therefore these appear only in an operating unit.

ALC—All voltages read with VTVM reference to ground.

1. ALC set with equal voltages on pin #1 of V-301, V-302.
2. Blanking switch "on" (knob out).
3. Meter properly zeroed with no reading—output control ccw.

Preamp Birdy Amp and Meter Amp—All voltages dc. Read with VTVM reference to ground.

1. Preamplifier in balanced condition, no signal input.

TABLE VII—SPARE PARTS LIST

REPLACEMENT PARTS LIST

Model #900-B—Series #1000 to 1100

Electronic Parts—Main Chassis Assembly

Relevant Drawing #811-307

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITORS
127-505	2	C-2, 3	Aerovox	AFH-1-52	Electrolytic, w/insul. tube, 40 mf, 450 v
127-030	1	C-4	Cornell-Dubilier	BR-445	Electrolytic tubular, 4 mf, 450 v
127-602	1	C-5A, B	Aerovox	AFH-2-40	Electrolytic dual, 50/30 mf, 350 v
125-020	1	C-8	Sprague	TMP1	Molded, 0.1 mf, 200 v
125-003	1	C-9	Aerovox	P88N215B	Molded, 0.1 mf, 400 v
127-008	3	C-10, 11, 14	General Instrument	6YDC	Tubular, 1500 mf, 6 v
127-500	2	C-12, 13	Aerovox	AFH-1-04	Electrolytic, 300 mf, 15 v
					CHOKES
143-105	3	CH-1, 2, 3	Grand Transformer	EL1719-A	2.3 h at 115 ma
143-106	1	CH-4	Grand Transformer	EL1677	0.5 h at 115 ma
					CRYSTAL RECTIFIERS
137-711	3	CR-1, 2, 3	Solitron	ST-CER-72	750 ma, 800 v, p.i.v.
137-709	2	CR-4, 5	Solitron	HC30	1100 ma, 30 v, w/leads
					FUSES
101-240	1	FS-1	Little Fuse	101-240	2 amp
101-315	2	FS-2, 3	Little Fuse	101-315	Slo-Blo, 1/10 amp
					JACKS
188-103	3	J-1, 2, 3	Amphenol	31-102	BNC connector
					PLUGS
184-013	1	P-3	Cinch	2770K	2770 K, cinch plug
					RELAYS
163-003	1	RLY-2	Potter & Brumfield	GA11D	DPDT, 6 v dc
					RESISTORS
112-152	2	R-1, 2	Allen-Bradley	EB	22 ohm, ½ W, 10%
112-009	1	R-3	Allen-Bradley	EB	3.3 ohm, ½ W, 5%
113-021	1	R-4	Tru-ohm	FRL	5 k ohm, 10 W
113-011	1	R-5	Tru-ohm	FRL	10 k ohm, 10 W
118-024	1	R-6	Allen-Bradley	JL68831	Pot., 50 k ohm, 2 W
112-599	1	R-6A	Allen-Bradley	EB	75 k ohm, ½ W, 5%
112-687	1	R-7	Allen-Bradley	GB	390 k ohm, 1 W, 5%
112-656	1	R-11	Allen-Bradley	EB	220 k ohm, ½ W, 10%
113-027	1	R-13	Ohmite	Brown Devil	17,500 ohm, 10 W
113-001	1	R-15	Tru-ohm	FRL	300 ohm, 10 W
112-164	2	R-16, 17	Allen-Bradley	EB	100 k ohm, ½ W, 10%
112-173	3	R-25, 26, 27	Allen-Bradley	EB	33 ohm, ½ W, 10%
118-088	1	R-29	CTS	#35	Pot., 0.5 megohm, ½ W
112-108	1	R-41	Allen-Bradley	EB	10 ohm, ½ W, 10%
					SOCKETS
184-018	1	S-3	Cinch	S-304-AB	Jones, S-304-AB
182-114	1	S-4	Cinch	S-306AB	Jones, S-306AB
182-103	1	S-6	Cinch	2675	Cinch 2675
182-116	2	S-10, 11	Cinch	13220	Jones #13220
					SWITCHES
162-008	1	SW-4	Carling	#316-63	DPDT Toggle
					TRANSFORMERS
141-118	1	T-2	Stancor	A-3250	
141-176	1	T-3	SNC	6P321	
					VACUUM TUBES
132-100	2	V-1, 2	Raytheon	OA2	Voltage regulating OA-2

REPLACEMENT PARTS LIST

Model #900-B—Series #1000 to 1100

Electronic Parts—Front Panel Assembly

Relevant Drawing #811-308

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					ATTENUATOR
107-005	1	RF Attenuator	Jerrold	107-005	Complete ass'y less knob 0-50 db in 10 db steps
					CAPACITORS
123-123	4	C-20, 21, 22, 23	Erie Resistor	331	Ceramic, 330 mmf
125-041	1	C-25	Aerovox	P-88	Paper-molded, .002 mf, 200 v
					DIAL LIGHTS
102-005	8	NE-2P	G.E.	NE2P	Dial indicator lamps
					METER
171-207	1	M-301	Minneapolis-Honeywell	MM-2	Output VHF-UHF, 100 ma
					PLUGS
184-020	2	P-17, 18	H. H. Smith	#102	Smith #102
184-032	1	P-302	Cinch	M-61	Jones #M-61
184-029	6	P-402, 403, 404, 502, 503, 504	Switchcraft	3502	Switchcraft phone #3502
					RESISTORS
118-047	5	R-8, 21, 22, 23, 24	CTS	K45	Pot., 100 k ohm, w/push-pull switch
118-063	1	R-9	Allen-Bradley	JA2N056-P104AA	Pot., 100 k ohm, 2 W
118-082	1	R-10	CTS	35	Pot., 5 k ohm, ½ W
118-084	1	R-14	CTS	95CV	Pot., 100 ohm, 2 W
118-085	1	R-28	CTS	K45	Pot., 50 k ohm, ½ W, w/sw.
112-836	1	R-32	Allen-Bradley	EB	5.6 megohm, ½ W, 10%
112-803	1	R-33	Allen-Bradley	EB	3.3 megohm, ½ W, 10%
112-710	1	R-34	Allen-Bradley	EB	560 k ohm, ½ W, 10%
112-797	1	R-35	Allen-Bradley	EB	3 megohm, ½ W, 5%
112-773	1	R-36	Allen-Bradley	EB	1.8 megohm, ½ W, 10%
118-028	1	R-37	Allen-Bradley	J82182	Pot., 500 k ohm, 2 W
112-866	1	R-38	Allen-Bradley	EB	10 megohm, ½ W, 10%
112-824	1	R-39	Allen-Bradley	EB	4.7 megohm, ½ W, 10%
112-629	1	R-40	Allen-Bradley	EB	130 k ohm, ½ W, 5%
118-080	1	R-506	CTS	35	Pot., 25 k ohm, 1 W
118-081	1	R-527	CTS	35	Pot., 5 k ohm, ½ W
					SWITCHES
162-018	1	SW-1	Carling	T-110B-63	SPST Toggle
162-008	1	SW-12	Carling	316-63	DPDT Toggle

REPLACEMENT PARTS LIST

Model #900-B—Series #1000 to 1100

Electronic Parts—Rear Shock Mount and Transformer Support Assembly

Relevant Drawing #811-309

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					PLUGS
184-028	1	P-16	Cinch	P-315-FHT	Jones P-315-FHT (less cover—include pins)
					SOCKETS
182-115	2	S-1, 2	Cinch	S-315-EB	Jones S-315-EB
					SWITCHES
162-008	1	SW-13	Carling	316-63	DPDT Toggle
					TRANSFORMERS
141-175	1	T-1	Sola Electric	71542	Sola #71542 w/capacitor C-1

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—Final Assembly
Relevant Drawing #812-032

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CABLE ASSEMBLIES
655-058	2	None	Jerrold	655-058	7¼" of RG-55/U with 2 connectors
655-059	1	None	Jerrold	655-059	6¼" of RG-55/U with 2 connectors
655-060	1	None	Jerrold	655-060	5⅛" of RG-55/U with 2 connectors
655-061	1	None	Jerrold	655-061	8⅝" of RG-55/U with 2 connectors
655-062	1	None	Jerrold	655-062	32" of RG-55/U with 2 connectors
659-120	1	None	Jerrold	659-120	Fixed oscillator probe
					CAPACITORS
Selected	1	C-26			60-cycle resonance
Selected	1	C-27			50-cycle resonance
					LINE CORD
659-116	1	None	Cornish	3532	Cornish 3532

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—Coaxial Switch Assembly
Relevant Drawing #822-042

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					JACKS
188-103	4	J-7, 8, 9, 10	Amphenol	31-102	BNC connector
					PLUGS
184-030	1	P-1	Cinch	P-304-CCT	Cinch P-304-CCT
					SWITCHES
161-126	2	SW-2A, B, C	Centralab	161-126	Wafer, phenolic section only
161-127	1	SW-5	Oak Mfg.	161-127	Wafer

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—ALC-UHF Detector
Relevant Drawing #811-310

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITORS
129-153	1	C-101	Erie Resistor	#0670000-14AO-102K	Mica button, 1000 mmf
129-202	1	C-102	Allen-Bradley	FA5C-4701	Feed-thru, 47 mmf
129-200	1	C-103	Allen-Bradley	FA5C-102W	Feed-thru, 1000 mmf
					CRYSTAL DIODES
139-106	2	CR-101, 102	Kemtron	930-081	K3A w/out leads, red dot
					JACKS
188-103	2	J-5, 6	Amphenol	31-102	BNC connector
					RESISTORS
112-293	2	R-101, 103	Allen-Bradley	EB	300 ohm, ½ W, 5%
112-614	1	R-102	Allen-Bradley	EB	100 ohm, ½ W, 10%
TR-53	1	TR-53	Jerrold	TR-53	Terminating resistor ass'y

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—VHF Oscillator
Relevant Drawing #811-311

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITORS
812-004	2	C-201, 206	Jerrold	HFT-65A	Trimmer, Jerrold HFT-65A
129-155	1	C-202	Erie Resistor	370FA	Mica button, 1000 mmf
811-122	1	C-203	Jerrold	811-122	Capacitor ass'y
121-049	1	C-204	Erie Resistor	331000-COKO-159C	NPO 1.5 mmf
128-509	1	C-205	Hammarlund	MAC-5	Variable 1.3-5.4 mmf

Electronic Parts—VHF Oscillator
(Continued)

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					COILS
156-089	3	L-203, 204, 205	Jerrold	156-089	Air wound
					FILTER BARRELS
823-018	2	FB-201, 202	Jerrold	823-018	Ass'y
					INDUCTORS
811-120	1	None	Jerrold	811-120	Cathode inductor ass'y
811-121	1	None	Jerrold	811-120	Plate inductor ass'y
					RESISTORS
112-236	1	R-201	Allen-Bradley	EB	100 ohm, ½ W, 10%
112-446	1	R-202	Allen-Bradley	EB	470 ohm, ½ W, 10%
					VACUUM TUBES
131-501	1	V-201	RCA	5675	RCA 5675

REPLACEMENT PARTS LIST

Model #900-B—Series #1000 to 1100

Electronic Parts—ALC and Blanking Circuits Meter Amplifier

Relevant Drawing #811-312

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITORS
125-013	2	C-301, 302	Cornell-Dubilier	PM451	Paper-molded, .01 mf, 400 v
125-001	2	C-303, 304	Sprague	65 P47304	Paper-molded, 0.47 mf, 400 v
125-019	1	C-305	Aerovox	P8292ZN13	Paper-molded, 1.0 mf, 200 v
121-053	2	C-306, 307	Erie Resistor	331000-COHO-759D	Insulated, 7.5 mmf, ±.5 mmf, 600 v
125-015	1	C-308	Sprague	4TM	Paper-molded, .02 mf, 400 v
					PLUGS
184-031	1	P-301	Cinch	13219	Jones #13219
					RELAYS
163-003	1	RLY-3	Potter & Brumfield	GA-11D	DPDT, 6v dc
					RESISTORS
112-320	2	R-301-302	Allen-Bradley	EB	470 ohm, ½ W, 10%
112-635	3	R-303, 320, 328	Allen-Bradley	EB	150 k ohm, ½ W, 10%
118-087	1	R-304	CTS	#35	Pot., 50 k ohm, ½ W
112-644	3	R-306, 317, 318	Allen-Bradley	EB	180 k ohm, ½ W, 10%
112-689	1	R-307	Allen-Bradley	EB	390 k ohm, ½ W, 10%
112-614	2	R-308, 313	Allen-Bradley	EB	100 k ohm, ½ W, 10%
112-803	4	R-310, 312, 323, 324	Allen-Bradley	EB	3.3 megohm, ½ W, 10%
112-698	1	R-311	Allen-Bradley	EB	470 k ohm, ½ W, 10%
118-083	1	R-314	CTS	#35	Pot., 100 k ohm, ½ W
112-362	2	R-315, 316	Allen-Bradley	EB	1000 ohm, ½ W, 10%
118-090	1	R-319	CTS	#35	Pot., 5000 ohm, ½ W
112-707	2	R-321, 322	Allen-Bradley	EB	560 k ohm, ½ W, 5%
112-758	2	R-325, 326	Allen-Bradley	EB	1.5 megohm, ½ W, 5%
113-016	1	R-327	Tru-ohm	FRL	3000 ohm, 10 W
112-489	1	R-330	Allen-Bradley	GB	10 k ohm, 1 W, 10%
112-406	2	R-331-332	Allen-Bradley	HB	2200 ohm, 2 W, 10%
					SOCKETS
182-117	1	S-301	Cinch	F126	Jones #F-126
182-103	1	S-302	Cinch	2675	Cinch 2675
					VACUUM TUBES
131-308	2	V-301, 302	G.E.	6AU6	6AU6
131-337	2	V-303, 304	Amperex	6CW5	6CW5
131-602	1	V-305	Amperex	6922	6922
131-400	1	V-306	G.E.	12AT7	12AT7

REPLACEMENT PARTS LIST

Model #900-B—Series #1000 to 1100

Electronic Parts—Harmonic Marker Generator

Relevant Drawing #811-313

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITORS
124-034	6	C-401, 406, 407, 435, 436, 437	Erie Resistor	H1-K60	Ceramic disc, .02 mf
126-011	2	C-402, 403	Electromotive	CM15E121J	Silver mica, 120 mmf
121-006	1	C-404	Centralab	TCZ	TCA 3.3 mmf
121-014	1	C-405	Centralab	TCZ	TCZ 20 mmf
123-125	4	C-408, 409, 416, 433	Erie Resistor	332	Ceramic, 47 mmf
128-515	3	C-410, 415, 434	Erie Resistor	0536-000-4R	Trimmer, .7-3 mmf
121-048	1	C-417	Erie Resistor	331	NPO .75 mmf
123-211	1	C-418	Centralab	D6	Ceramic, 39 mmf
126-010	1	C-419	Electromotive	CM15E161J	Silver mica, 160 mmf
126-008	2	C-420, 424	Electromotive	CM15E151J	Silver mica, 150 mmf
124-031	4	C-421, 422, 426, 430	Erie Resistor	811	Ceramic disc, .01 mf
126-050	1	C-423	Electromotive	CM15E300J	Silver mica, 30 mmf
121-004	2	C-425, 431	Centralab	TCZ	TCZ 1.5 mmf
121-016	2	C-427, 428	Centralab	TCZ	TCZ 24 mmf
121-003	2	C-429, 432	Centralab	TCZ	TCZ 1.0 mmf
					COILS
156-440	1	L-401	Jerrold	156-440	Special Jerrold
156-441	1	L-402	Jerrold	156-441	Special Jerrold
156-461	1	L-403	Jerrold	156-461	Special Jerrold
156-458	1	L-404	Jerrold	156-458	Special Jerrold
156-457	1	L-405	Jerrold	156-457	Special Jerrold
156-443	1	L-406	Jerrold	156-443	Special Jerrold
156-442	3	L-407, 408, 410	Jerrold	156-442	Special Jerrold
156-459	1	L-409	Jerrold	156-459	Special Jerrold
156-444	1	L-411	Jerrold	156-444	Special Jerrold
156-445	1	L-412	Jerrold	156-445	Special Jerrold
156-446	1	L-413	Jerrold	156-446	Special Jerrold
156-460	1	L-414	Jerrold	156-460	Special Jerrold

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CRYSTALS
139-118	1	X-401	Int'l Crystal	F-605	5000.000 kc ±.0025% (32 mmf, 26° C)
					CRYSTAL DIODES
139-119	3	CR-401, 403, 405	Amperex	IN87	IN87, w/leads
139-102	3	CR-402, 404, 406	Kemtron	K3A	K3A, w/leads
					JACKS
188-103	1	J-401	Amphenol	31-102	BNC connector
					PLUGS
184-030	1	P-401	Cinch	P-304-CCT	CJ P-304-CCT
					RESISTORS
112-581	1	R-401	Allen-Bradley	EB	56 k ohm, ½ W, 5%
112-614	5	R-402, 415, 418, 419, 420	Allen-Bradley	EB	100 k ohm, ½ W, 10%
112-497	1	R-403	Allen-Bradley	EB	12 k ohm, ½ W, 5%
112-200	2	R-404, 405	Allen-Bradley	EB	51 ohm, ½ W, 5%
112-254	3	R-406, 411, 424	Allen-Bradley	EB	150 ohm, ½ W, 5%
112-485	1	R-407	Allen-Bradley	EB	10 k ohm, ½ W, 5%
112-362	3	R-412, 423, 426	Allen-Bradley	EB	1000 ohm, ½ W, 10%
112-578	2	R-413, 421	Allen-Bradley	EB	51 k ohm, ½ W, 5%
112-740	2	R-414-422	Allen-Bradley	EB	1 megohm, ½ W, 10%
112-782	1	R-416	Allen-Bradley	EB	2.2 megohm, ½ W, 10%
112-572	1	R-417	Allen-Bradley	EB	47 k ohm, ½ W, 10%
118-026	1	R-425	Allen-Bradley	JL68833A	Pot., 10 k ohm
					SOCKETS
185-116	3	S-402, 403, 404	Switchcraft	3501FP	Switchcraft phone jack 3501FP
					TEST POINTS
129-226	2	TP 10 MC, TP 100 MC	Switchcraft	FTSM-2-TUR-CR	Feed-thru Sealectro #FT-SM-2
					VACUUM TUBES
131-602	2	V-401, 403	Amperex	6922	6922
131-313	1	V-402	G.E.	6CB6	6CB6

REPLACEMENT PARTS LIST

Model #900-B—Series #1000 to 1100

Electronic Parts—Preamp and Birdy Amp

Relevant Drawing #811-314

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
127-016	2	C-501, 503	Cornell-Dubilier	BBR12-150	12 mf, 150 v
128-501	1	C-502	Erie Resistor	0557-000 U2P0-34R	8059 mmf trimmer
128-521	1	C-504	Electromotive	469	170-780 mmf trimmer
125-008	5	C-507, 509, 512, 516, 517	Aerovox	P8292ZN11A	.25 mf, 200 v
128-517	1	C-508	Electromotive	464	25-280 mmf trimmer
126-033	1	C-510	Electromotive	DM19152J	Mica, 1500 mmf
123-177	1	C-511	Centralab	D6	Ceramic, 2000 mmf
126-030	1	C-513	Electromotive	DM20128G	Mica, 1800 mmf
125-042	1	C-514	Aerovox	P88	Paper-molded, .02 mf, 200 v
128-513	1	C-515	Electromotive	466	80-480 mmf trimmer
124-031	1	C-518	Erie Resistor	ED.01	Disc, .01 mf
125-001	1	C-524	Aerovox	P88	.047 mf, 400 v
					COILS
823-021	2	L-501, 502	Jerrold	823-021	Transformer ass'y
					JACKS
188-103	1	J-501	Amphenol	31-102	BNC connector
					PLUGS
184-031	1	P-501	Cinch	13219	Jones #13219
183-221	1	P-506	Cannon	XLR-3-32	Cannon
					RELAYS
163-003	1	RLY-1	Potter & Brumfield	GA-11D	P & B GA-11D
					RESISTORS
112-710	3	R-501, 502, 513	Allen-Bradley	EB	560 k ohm, ½ W, 10%
112-320	2	R-503, 504	Allen-Bradley	EB	470 ohm, ½ W, 10%
112-149	1	R-505	Allen-Bradley	EB	22 ohm, ½ W, 5%
112-545	2	R-507, 510	Allen-Bradley	EB	30 k ohm, ½ W, 5%
112-704	2	R-508, 509	Allen-Bradley	EB	510 k ohm, ½ W, 5%
112-611	3	R-511, 512, 532	Allen-Bradley	EB	100 k ohm, ½ W, 5%
112-385	2	R-514, 530	Allen-Bradley	HB	1500 ohm, 2 W, 10%
112-362	4	R-516, 531, 534, 536	Allen-Bradley	EB	100 ohm, ½ W, 10%
112-600	1	R-517	Allen-Bradley	GB	75 k ohm, 1 W, 5%
112-665	2	R-526, 535	Allen-Bradley	EB	270 k ohm, ½ W, 5%
112-507	1	R-528	Allen-Bradley	GB	15 k ohm, 1 W, 5%
112-452	1	R-529	Allen-Bradley	EB	5100 ohm, ½ W, 5%
112-572	1	R-533	Allen-Bradley	EB	47 k ohm, ½ W, 10%
					SOCKETS
185-116	3	S-502, 503, 504	Switchcraft	3501FP	Switchcraft jack #3501FP
					SWITCHES
162-008	1	SW-501	Carling	316-63	DPDT, 6 v dc
					TRANSISTORS
130-101	2	Q-1, 2	RCA	2N1224	RCA
					TUBES
131-602	1	V-501	Amperex	6922	6922
131-308	1	V-502	G.E.	6AU6	6AU6
131-402	1	V-503	RCA	12AY7	12AY7

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—Sweep Oscillator
Relevant Drawing #815-124

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CABLE ASSEMBLIES
659-109	1	None	Jerrold	659-109	Probe
659-121	1	None	Jerrold	659-121	Probe "A"
659-122	1	None	Jerrold	659-122	Probe "B"
					CAPACITORS
128-203	1	Plate Condenser			Part of inner rod assembly
128-204	1	Grid Capacitor			Selected
128-207	1	C-601			Wobbulator condenser (part of wobbulator assembly)
129-200	6	None	Allen-Bradley	FA5C-102W	Part of filter-barrel assemblies
					FILTER BARREL ASSEMBLIES
823-018	3	FB-601, 602, 603	Jerrold	823-018	
					PILOT LIGHTS
102-002	2	PL-1, 2	G.E.	#47	Lamps
					PLUGS
184-010	1	P-15	Cinch	P-306 CCT	Part of plug assembly
					RESISTORS
112-443	1	R-601	Allen-Bradley	EB	4700 ohm, ½ W, ±5%
112-950	6	R-602, 603, 604, 605, 606, 607	Allen-Bradley	CB	100 ohm, ¼", ±5%, part of probe assemblies
					SWITCHES
161-124	1	SW-3A, B			Part of detent switch assembly
					TUBES
131-503	1	V-601	RCA	5675	5675 modified
					WOBBULATOR
822-004	1	Wobb	Jerrold	822-004	Wobbulator including capacitor

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—Mixer
Relevant Drawing #811-315

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITOR ASSEMBLY
811-123	3	C-704, 705, 706	Jerrold	811-123	Capacitor core and sleeve
					CAPACITORS
128-515	4	C-701, 703, 716, 715	Erie Resistor	0536-000-4R	Trimmer, .7-3 mmf
812-004	2	C-702, 707	Jerrold	HFT-65A	HFT-65A trimmer
129-200	1	C-708	Allen-Bradley	FA5C-102W	Feed-thru, 1000 mmf
129-153	1	C-709	Erie Resistor	4700CH	Feed-thru, 1000 mmf
129-202	1	C-710	Allen-Bradley	FA5C-4701	Feed-thru, 47 mmf
125-008	2	C-711, 712	Aerovox	P8292	Paper, .25 mf, 200 v
129-150	2	C-713, 714	Erie Resistor	4700CB	Feed-thru, .0054 mf
					CRYSTAL DIODES
139-107		CR-701, 702	Jerrold	139-107	K3A, w/out leads (Blue)
139-111		CR-703, 704	Jerrold	139-111	K3A, w/out leads (Brown)
					INDUCTORS
215-124	1	L-701	Jerrold	215-124	Copper strip
701-032	2	L-708, 709	Zierick	263TC	Zierick lug, 263TC
					JACKS
188-103	3	J-701, 702, 703	Amphenol	31-102	BNC connectors
					PLUGS
184-013	1	P-4	Cinch	2770K	Cinch
					RESISTORS
112-030	2	R-701, 704	Allen-Bradley	EB	5.1 ohm, ½ W, 5%
112-950	2	R-705, 706	Allen-Bradley	CB	100 ohm, ¼ W, 5%
112-614	1	R-708	Allen-Bradley	EB	100 k ohm, ½ W, 10%
112-293	2	R-707-709	Allen-Bradley	EB	300 ohms, ½ W, 5%

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—Marker Inserter
Relevant Drawing #811-315

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITORS
123-101	1	C-801	Erie Resistor	331	Ceramic, 25 mmf
129-203	1	C-802	Garlock	69001-0500	Feed-thru, 1.8 mmf
					CRYSTAL DIODE
139-102	1	CR-801	Kemtron	K3A	K3A w/leads
					JACKS
188-103	3	J-801, 802, 803	Amphenol	31-102	BNC connectors
					RESISTORS
112-458	1	R-801	Allen-Bradley	EB	5600 ohm, ½ W, 10%
112-362	1	R-802	Allen-Bradley	EB	1000 ohm, ½ W, 10%

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Electronic Parts—Removable Detector
Relevant Drawing #822-048

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					CAPACITORS
129-202	2	C-901, 902	Allen-Bradley	AB FA5C-4701	Feed-thru, 47 mmf
129-153	1	C-903	Erie Resistor	0670000-14A0-102K	Mica-button, 1000 mmf
					CRYSTAL DIODE
139-106	2	CR-901, 902	Jerrold	139-106	K3A w/leads (Red)
					JACKS
188-103	2	J-901, 902	Amphenol	31-102	BNC connectors
					SOCKETS
185-107	2	S-901, 902	H. H. Smith	#101	Smith # 101
					RESISTORS
112-293	2	R-901, 903	Allen-Bradley	EB	300 ohm, ½ W, 5%
112-656	1	R-902	Allen-Bradley	EB	220 k ohm, ½ W, 10%

REPLACEMENT PARTS LIST
Model #900-B—Series #1000 to 1100
Hardware—Front Panel Assembly
Relevant Drawing #811-308

JERROLD PART #	QTY	SCHEM. DES.	MFR'S NAME	MFR'S #	DESCRIPTION
					DIAL ASSEMBLY
232-087	1	None	Gessner Mfg. Co.	232-087	Main bezel, molded
237-003	1	None	Acme Specialties	237-003	Main dial, bezel window
215-148	2	None	Guild Design	215-148	Main dial, bezel window clamp
232-086	1	None	Gessner Mfg. Co.	232-086	Dial indicator, light shield
275-011	1	None	Electronics, Inc.	275-011	R.H. dial indicator board
275-012	1	None	Electronics, Inc.	275-012	L.H. dial indicator board
231-143	2	None	August Frank	231-143	Dial indicator arrow plates
232-088	1	None	Gessner Mfg. Co.	232-088	Vernier dial window
221-195	1	None	Jerrold	221-195	Vernier dial knob
221-196	1	None	Jerrold	221-196	Vernier dial pinion
					KNOBS
239-024	10	None	Jerrold	239-024	Small, grey, ass'y
239-026	1	None	Jerrold	239-026	Medium, w/skirt, grey, ass'y
239-030	1	None	Jerrold	239-030	Medium, wing, grey, ass'y
239-034	1	None	Jerrold	239-034	Large, w/dot, grey, ass'y
					RELEVANT DWG. # SWEEP OSC. ASS'Y
					DIAL
237-004	1	None			Large, main tuning dial
					KNOB
239-033	1	None	Jerrold	239-033	Large, w/vernier dial, grey, ass'y
					RELEVANT DWG. # TRANSFORMER SUPPORT AND FINAL ASS'Y
					CABINET
812-024	1	None	Amco Eng.	812-024	900-B cabinet complete

NOTES

SCHEMATIC

RF CIRCUIT
900 B

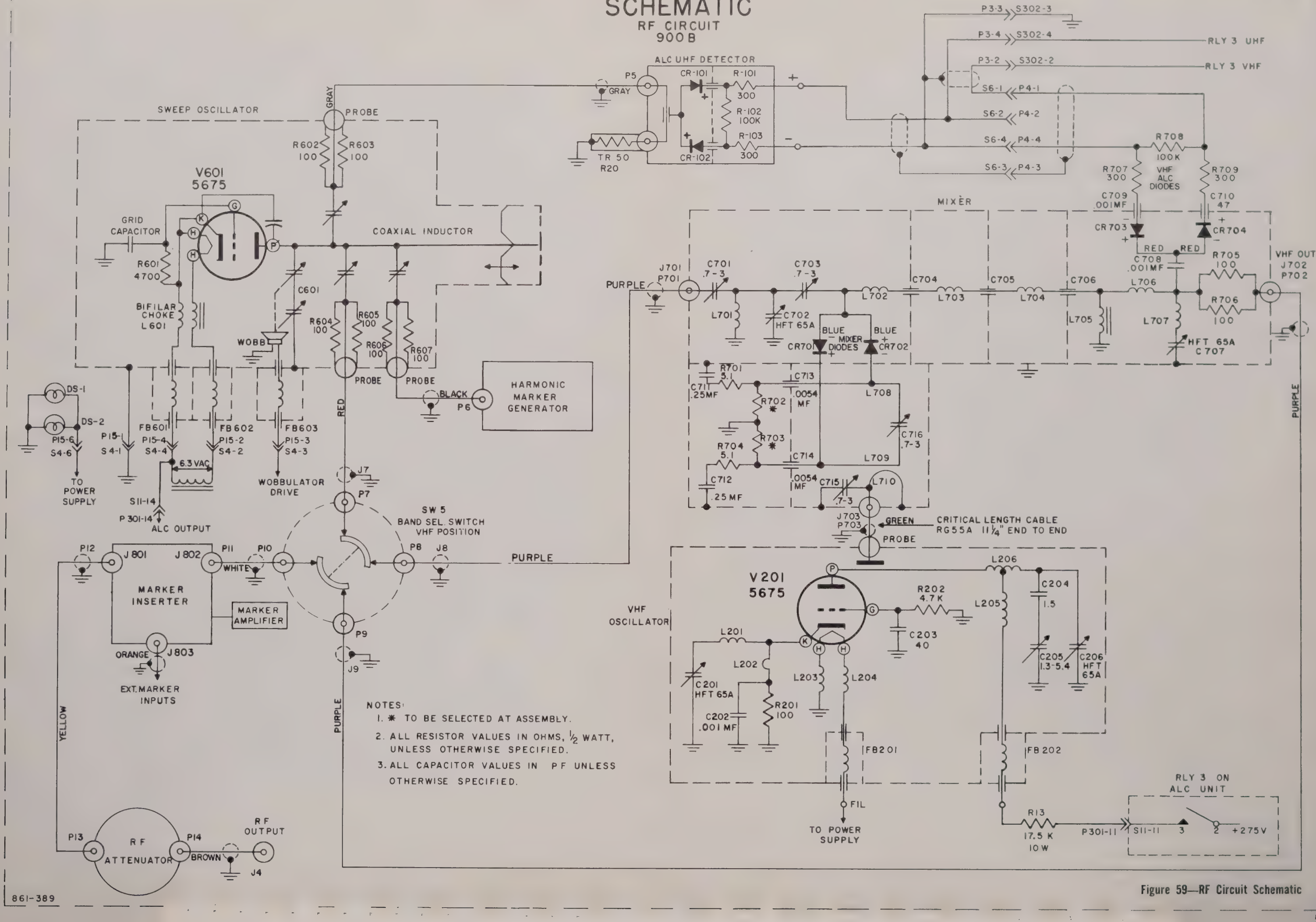
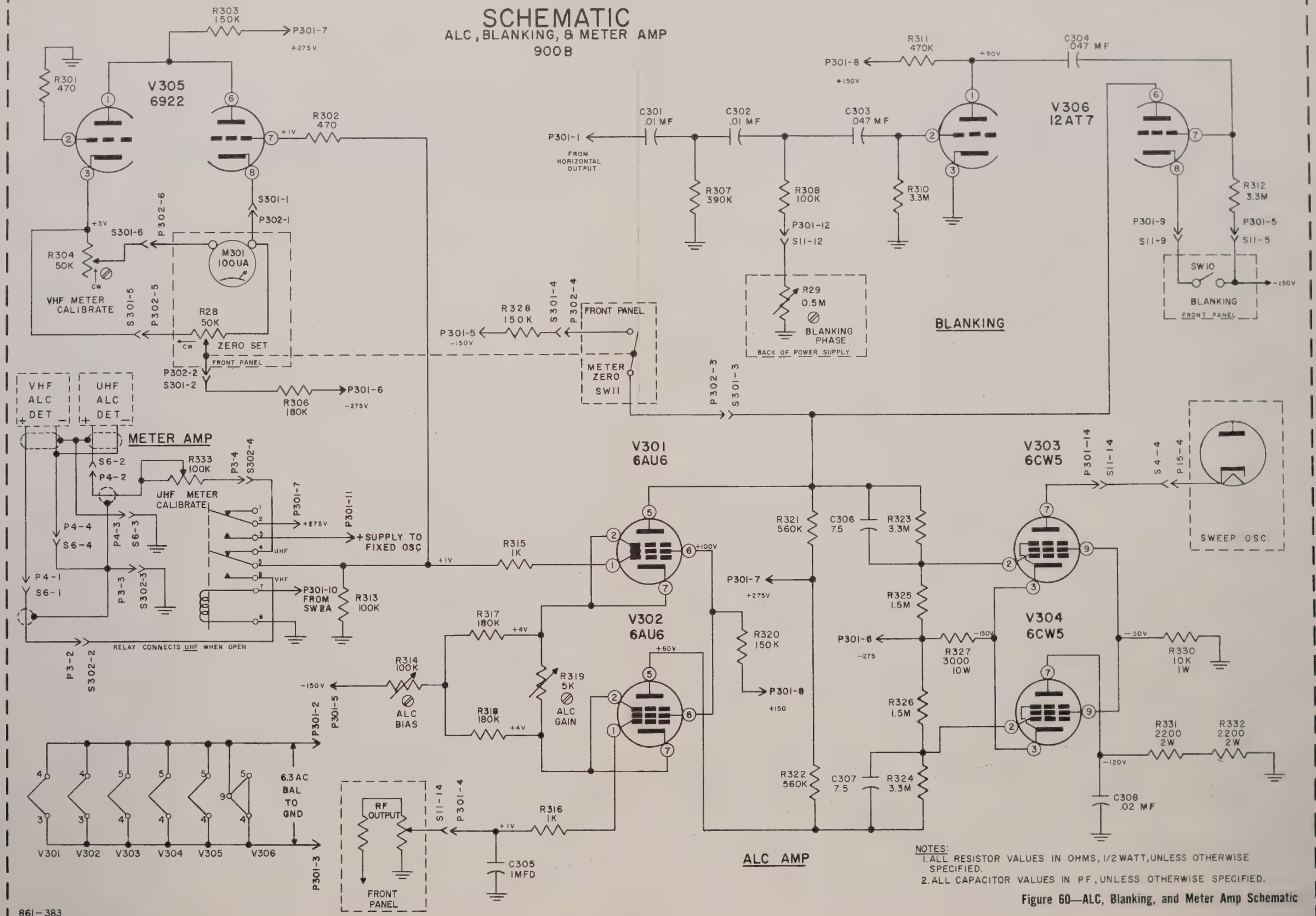


Figure 59—RF Circuit Schematic

NOTES

SCHEMATIC
ALC, BLANKING, & METER AMP
900B



NOTES:
1. ALL RESISTOR VALUES IN OHMS, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES IN PF, UNLESS OTHERWISE SPECIFIED.

861-383

Figure 60—ALC, Blanking, and Meter Amp Schematic

NOTES

SCHEMATIC

POWER SUPPLY

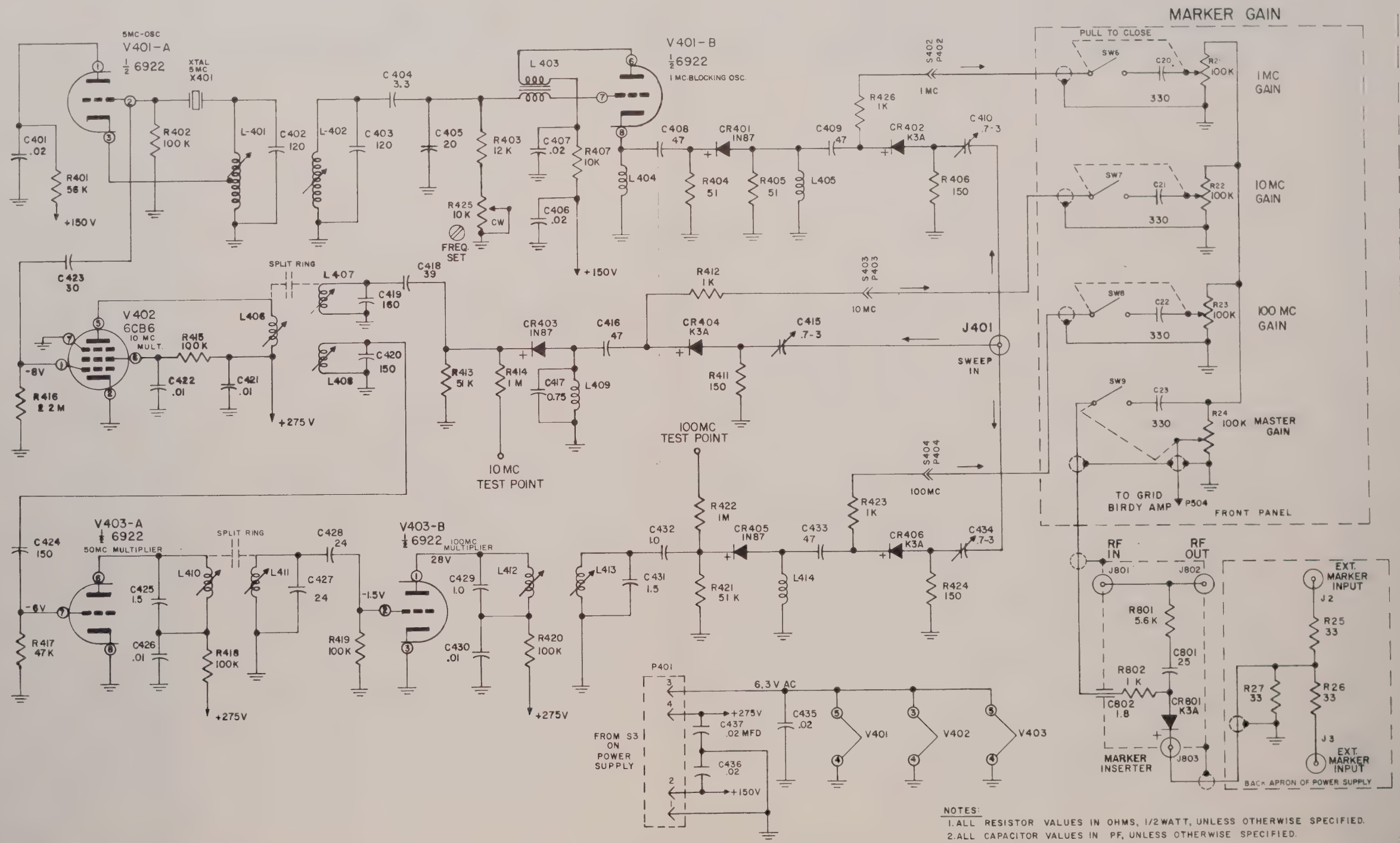
900B

Figure 61—Power Supply Schematic

861-388

NOTES

SCHEMATIC
HARMONIC MARKER
900 B



NOTES:
1. ALL RESISTOR VALUES IN OHMS, 1/2 WATT, UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITOR VALUES IN PF, UNLESS OTHERWISE SPECIFIED.

861-386

Figure 63—Harmonic Marker Schematic

NOTES

JERROLD®

Jerrold Electronics Corporation

INDUSTRIAL PRODUCTS DIVISION

15th and Lehigh Avenue · Philadelphia 32, Pa.

BAldwin 6-3456

REPRESENTED BY

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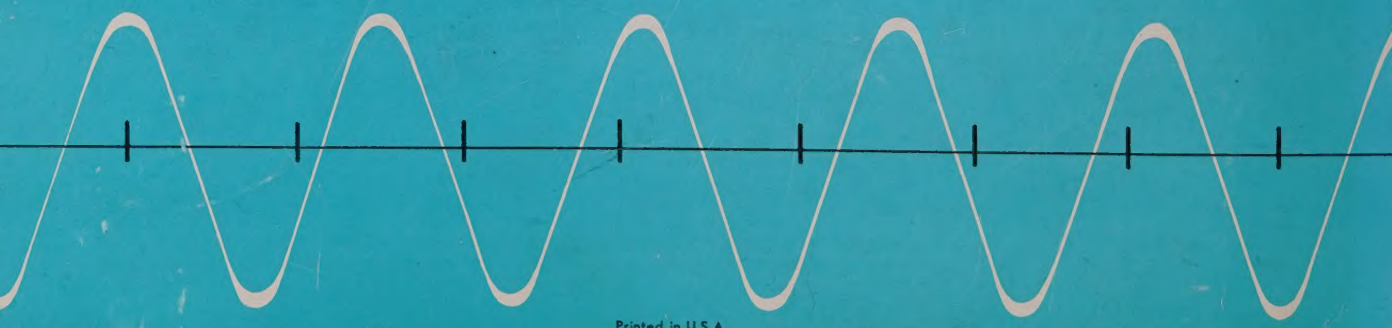
CANADA: Jerrold Electronics (Canada) Ltd., Toronto, Canada



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